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AMERICAN MACHINIST

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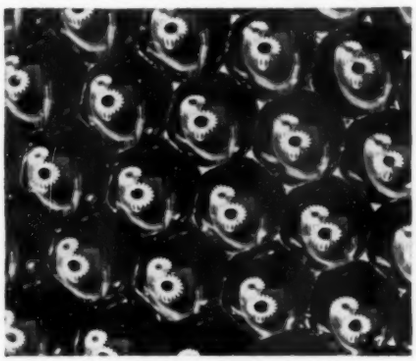

Honeycomb—*This fly's-eye view of a pair of gears indicates that quality standards can be duplicated in production*

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MAJOR ARTICLES

Geared for Quality 121
Training Makes the Foreman ..... *George Stuart Brady* 125
Floor for 100-Ton Machines 127
Dust-Free Cuts on Cast Iron 128
How to Hold the Work ... *J. R. Longstreet* and *W. K. Bailey* 130
Short Cuts for the Small Shop ..... *A. H. Waychoff* 133
Where Welding Aids Machining ..... *Herbert Chase* 134
Every Shell Needs a Case 136

IDEAS FROM PRACTICAL MEN

A Fixture for Parallel Boring ..... *Henry C. Francis* 140
Heel Supports for Clamps ..... *Peter L. Budwitz* 140
Hollowed Oilstones .... *Alexander, Southwick* and *Barnden* 140
A Non-Scratch Feeder for Stainless Pins ..... *O. V. Howe* 141
Improvised Puller for Motor Armatures ... *Joseph I. Karash* 141
An Auxiliary Turret That Saves Time ..... *Douglas Turner* 142
Study in Fixture Design ..... *C. G. Williams* 142

SHORT ARTICLES

The Other Fellow's Product ..... *John R. Godfrey* 43
A Three-Legged Stool Never Rocks ..... *H. M. Lane* 126

NEWS OF THE INDUSTRY

Gaging Business 146b
Inside Detroit 146e
Watching Washington. 146h
Names in the News... 146j
Business Items 146l
Obituaries 146l

DEPARTMENTS

What's in This Issue... 41
Reference Book Sheet... 143
Editorial 146
Shop Equipment News.. 147
Trade Publications 154
New Books 154

ADVERTISING PAGES REMOVED

Way back in 1916, Mr. Cook wrote:

ROYAL TYPEWRITER CO.

In regard to the American Machinist which we subscribe to for use in our plant, I usually go through the entire book, marking off advertisements that might appeal to our Purchasing Department or any other division of our plant.

I read the articles and mark them, placing on the outer cover of the book the names of the persons I want to read them, and the page the article is on. When an article is especially inviting to us, whether it is on Safety First, on the Trades Schools, on Shop Practices, or other important items, we make a typewritten copy of it and hold in our files for reference.

Chas. B. Cook,
Vice-President.

1940 . . . STILL subscribing . . . STILL "marking off" the ads

"We congratulate your fine magazine and want you to know that we think it well-worth while."

WHAT'S IN THIS ISSUE

SOUND TEETH

We were still at a mighty tender age when we first learned there were gears *and* gears. Our first Meccano set made the difference clear. Some of its gears wouldn't mesh at all! In industry too there are gears—*and* gears. We've seen cast-iron ones put in service without any work at all on them after they came from the sand; we've also seen gears so perfectly finished that no commercial test could unearth any backlash, binding, hum or vibration.

Quality in gears is something half tangible, half abstract. Correct design, accurate manufacture and proper installation are essential. So is the "know-how" which the maker gains only by experience. For these and other reasons too numerous to mention we feel you'll be interested in how Kearney & Trecker has made a success of making its own gears. The story begins on page 121.

GEORGE STUART BRADY

FLOORED

The first job we had when we got out of school was that of "test man" for a large electrical equipment manufacturer (name on request). Along with about five hundred other recruits, we were given a screw driver, a monkey wrench and a pair of pliers and put to tinkering with vast and mysterious machinery under the direction of (we then thought) the world's most brilliant foreman. We'll never forget our awe at the dozen or so 100- and 50-ton cranes in one bay running on two levels. Nor will we ever forget that iron floor. We slid all over it, we turned our ankles on it, we fell down on it, we dropped tools in the slimy bilge collected in its slots. Right in the next building was a honey of a wood-block floor, but you couldn't clamp anything down to it. Many's the time we wondered if the virtues of both couldn't be combined. Now along comes William Sellers and constructs a heavy erecting floor which does combine the advantages of the iron and the wood-block types. If you have to assemble heavy machinery you'll be interested in the description of it on page 127.

CONTACT

The above-mentioned foreman was the first boss we ever had, and at first we were scared stiff. Two days, however, proved that he was one swell egg. He was the fellow we got to know the company through—its policies, its attitude, its *character*. And we thought it was a pretty swell company.

The point is that the importance of every foreman in conveying to his men the actual character of the company is too often overlooked. He is the only official contact the men have with the management, the only man who can give them facts instead of propaganda, information instead of rumors. And he's the only one who can prevent petty annoyances from becoming major grievances. "Contact man" should be his nickname. As such his duties, obligations and qualifications are discussed on page 125 by George Stuart Brady, who has a deep insight into the subject.

DINGBATS

We never fail to be impressed by the ingenuity shown by shop men in all parts of the country. Eternally they're thinking up gadgets, hickeys and dingbats to make their work easier or faster. Often they're so simple we wonder why we didn't think of them ourself. We'll bet that out of A. H. Waychoff's collection of ideas on page 133 you'll get quite a few that will help out in your shop.

WELD DONE

Now that welding's something more than just a way to repair busted parts, new and interesting applications of the process are cropping up all the time. On page 134 Herbert Chase, a roving journalist-engineer who gets around if ever a man does, tells about the way Black & Decker makes an odd-shaped part. In it welding helps, rather than replaces, machining operations. We heartily recommend it to anyone who's ever been stumped by a production machining problem somewhat unusual.

HERBERT CHASE

DOWN TO CASES

Shells are only one component of a round of ammunition. Other mechanical parts include the cartridge case, fuse and primer. Manufacturing improvements must be made on all parts to achieve the maximum gain in production efficiency. Frankfort Arsenal has considered all factors, and has improved methods for producing cartridge cases as well as the other parts. Particular attention has been paid to tooling, which is one reason why the story beginning on page 136 should be of special interest to all metal-workers, whether tied in with national defense or not.

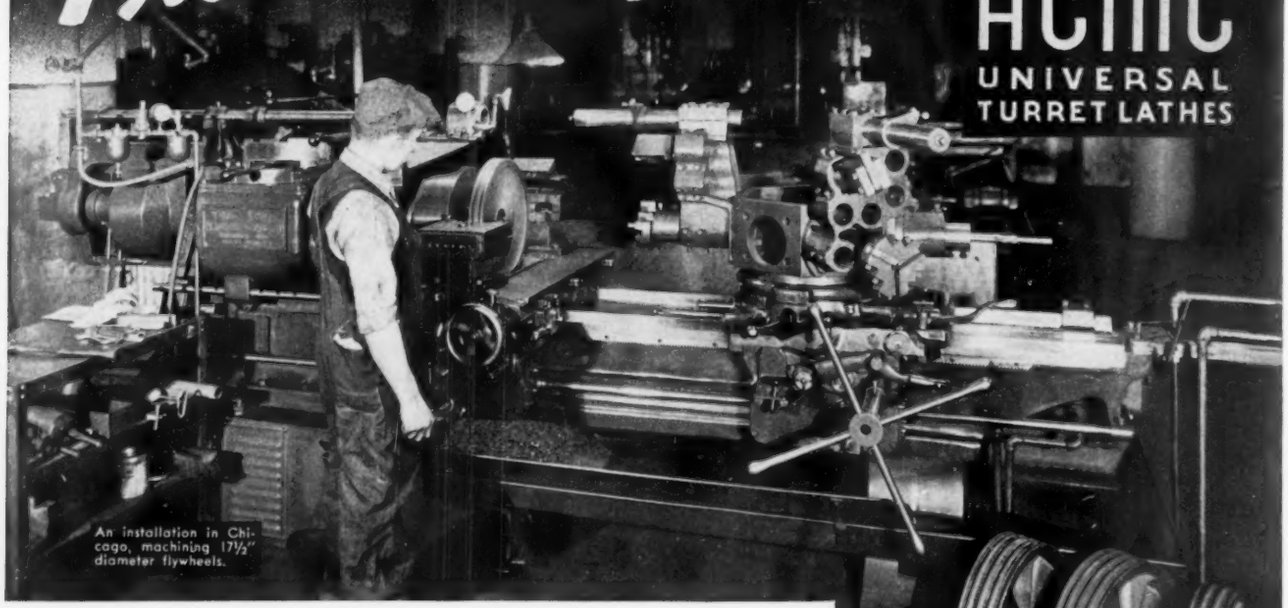
COMING

Line assembly of aircraft is a subject that's been talked about a lot in the last few months, and one that's probably caused as much misunderstanding as any other. To read some of the things printed you'd think planes were rolling off assembly lines as fast as Fords. Big strides have been made recently, of course, in assembling huge planes. In an early issue of AMERICAN MACHINIST we'll give you the inside story on how Boeing does it.

Metallurgy is usually a pretty grim subject to the shop man. But the metallurgist can do a lot for the machinist if he's given half a chance. How he can often improve the machinability, hardenability and surface finish of a machined part will be revealed in a forthcoming article.

Production up 95%

Cincinnati ACME UNIVERSAL TURRET LATHES



An installation in Chicago, machining 17½" diameter flywheels.

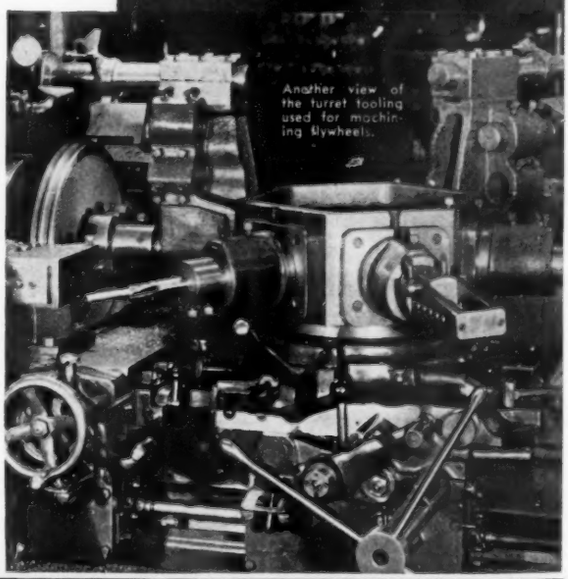
TOOL ENGINEERING
PLUS
STURDY HIGH SPEED MACHINE
EQUALS
LOWER COST AND GREATER PRODUCTION

● The Cincinnati Acme Universal Turret Lathe illustrated has several innovations in its design, adapting it to the faster and finer machining of flywheels.

The special multiple tooling arrangement makes possible this exceptional saving. Close limits are easily held on both sides by a dual indicator. Air controlled chucking equipment reduces time between pieces.

In comparing this customer's present results against those of their previous method, they are producing 14 to 18 more flywheels per eight-hour day, thereby increasing production approximately 95%! And with tolerances well within customer's requirements!

This sort of outstanding performance can be duplicated in *your* plant. Our Tool Engineers will gladly give you the details of how to increase your production and accuracy.



Another view of the turret tooling used for machining flywheels.

THE ACME MACHINE TOOL CO., ... CINCINNATI, OHIO.

Included in a $200,000 outlay for tools for gear manufacture are hardened and ground bushings, base circles, hardened and ground measuring pins, micrometers, arbors and other equipment for checking gear quality

Geared for Quality

Kearney & Trecker found that first grade gears don't just happen. So it backed modern production equipment with a well planned testing department to get the results required

MILLING MACHINE gears must deliver a smooth flow of power for feeding the work and driving the spindle. There must be a minimum of backlash; quiet operation is desirable. The Kearney & Trecker Corporation has installed $200,000 worth of equipment in the past fifteen months to get the necessary accurate gears. Included in the purchases were new tools and a new gear laboratory for controlling quality of tooth form.

Processes by which the desired tooth form is secured are under the control of the gear laboratory, arranged as shown on page 123. Located in the center of the machine shop, the laboratory is sound-proofed by a double plywood wall with insulation between. Windows all around are double glass with the inner glass set at a slight angle to the outer one to prevent passage of vibrations. Involute, lead checking and space checking machines are insulated from floor vibrations by ½-in. rubber sheets.

Temperature of the laboratory is kept at 70 F. in the winter time and six to eight degrees lower than the outside temperature in the summer time. Humidity is more carefully controlled than the temperature to prevent formation of rust on machines and gages. All air is taken from the outside and filtered. To avoid stroboscopic effect of mercury arc lights, it was necessary to install a mercury arc and incandescent lamp combination. Each lighting unit consists of one 300-watt mercury arc, and three 250-watt incandescent lamps.

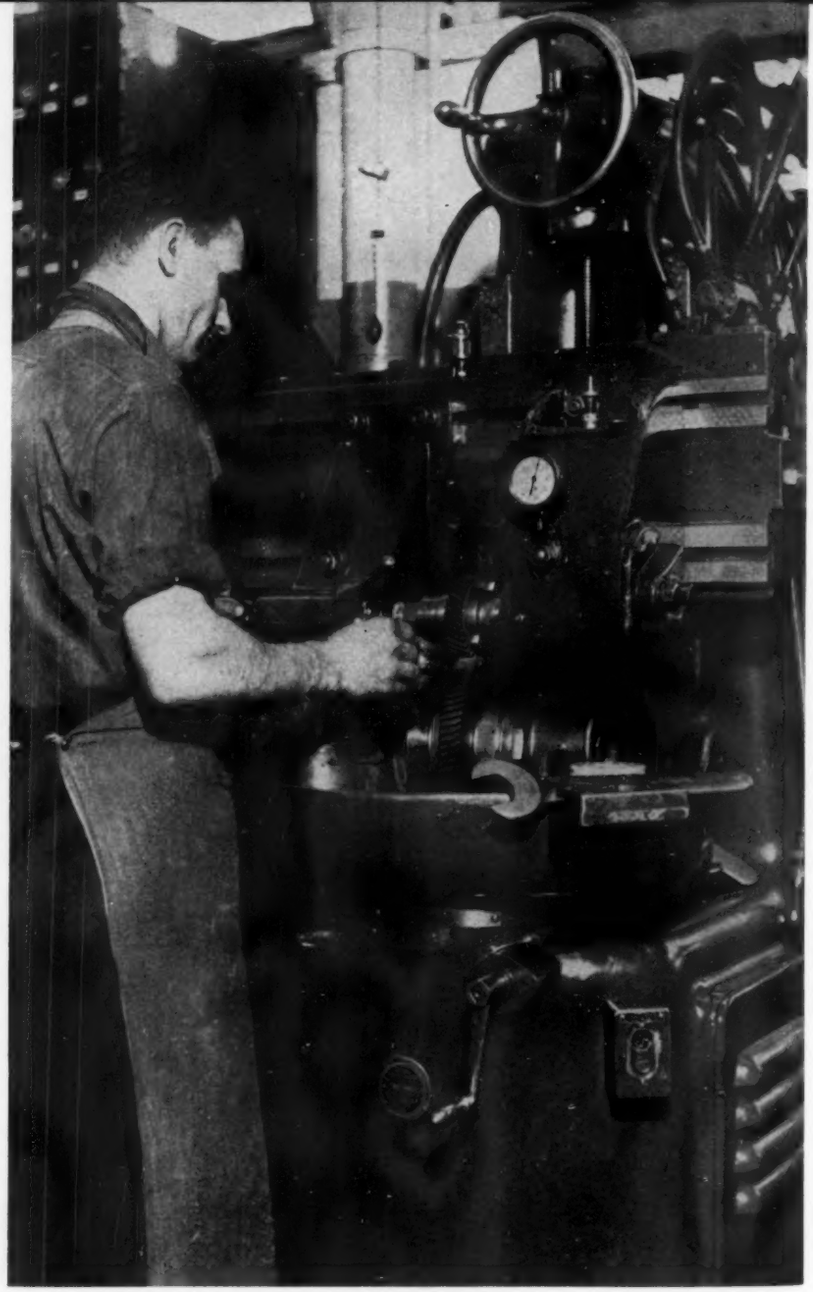
Pitch line, involute, spacing and size over pins of the first gear from each new set-up in hobbers, shapers, shavers or grinders are checked in the laboratory before production can begin. About ten per cent are checked during the production run. If the tools are changed, the first gear after the change goes through the same

process. Quiet running gears which are interchangeable are being obtained by working to the base pitch and by finishing the active profile to within 0.0002 in. of the true involute.

Some 2,000 different gears are manufactured by the department so that pins are considered the most economical means of gaging. They are used to measure up to 18-pitch gears. The pins are hardened steel, ground and lapped to a high degree of accuracy. The tolerance over pins on finish hobbing or shaping operations before shaving or grinding is ±0.001 in. On dividing head gears the tolerance over pins is ±0.0005. The tolerance on the tooth spacing of a finished gear is 0.0002 in., tooth to tooth.

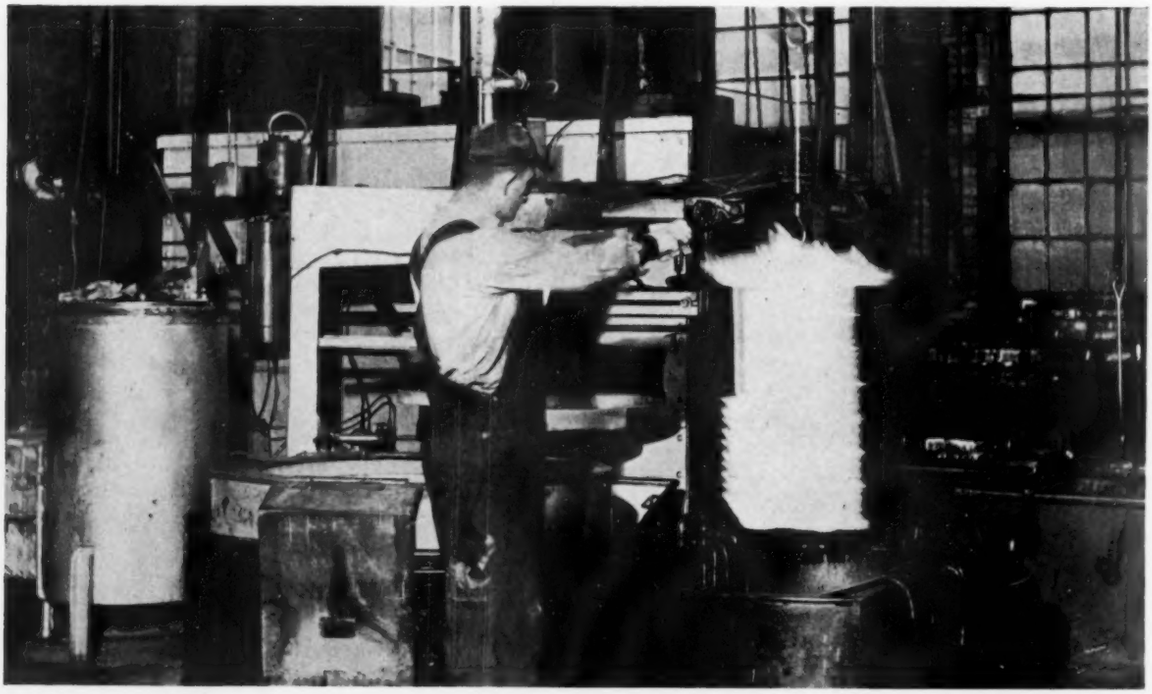
A Gleason speeder is available in the laboratory for occasional checks of sound on spur gears and to develop bearing on all bevel gears. All gears are rolled in a Brown & Sharpe gear tester with a master after finish cutting, to insure that only dimensionally correct gears go to the carburizing furnace.

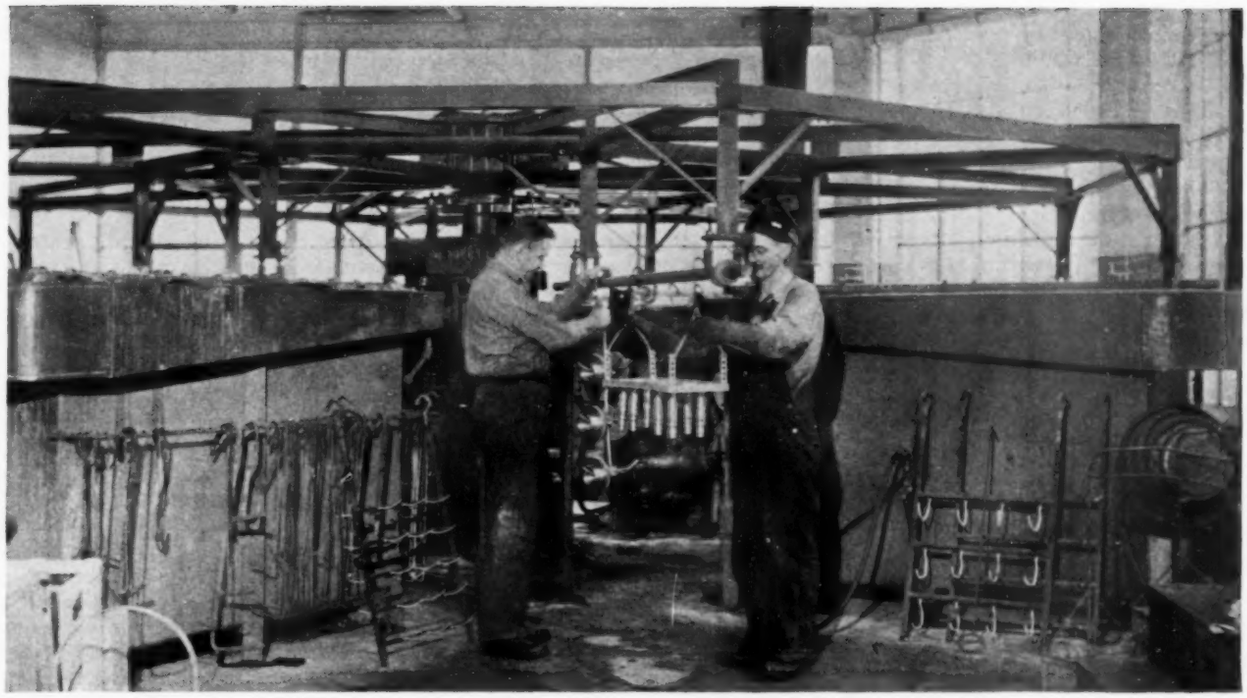
The gear laboratory and metallurgical department cooperate in determining the growth and distortion of gears in heat-treatment. When growth to be expected in heat-treatment has been determined, dimensions for cutting the gears are arranged to allow for the change in shape. These dimensions are kept on master cards filled in the laboratory. Heat-treating per-



Gears are lapped for quietness prior to final inspection in one of two machines using cast iron laps and water soluble lapping compounds

Hot gears ready for dropping into oil quench tank after carburizing in Homo-carb furnace. Rectangular furnace in the background is a gas-fired unit with three vertical muffles for pre-heating, heating and drawing long shafts and screws



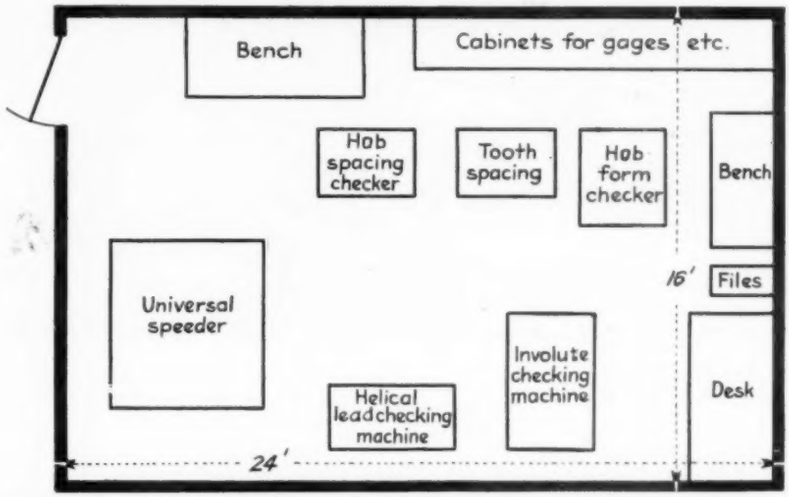


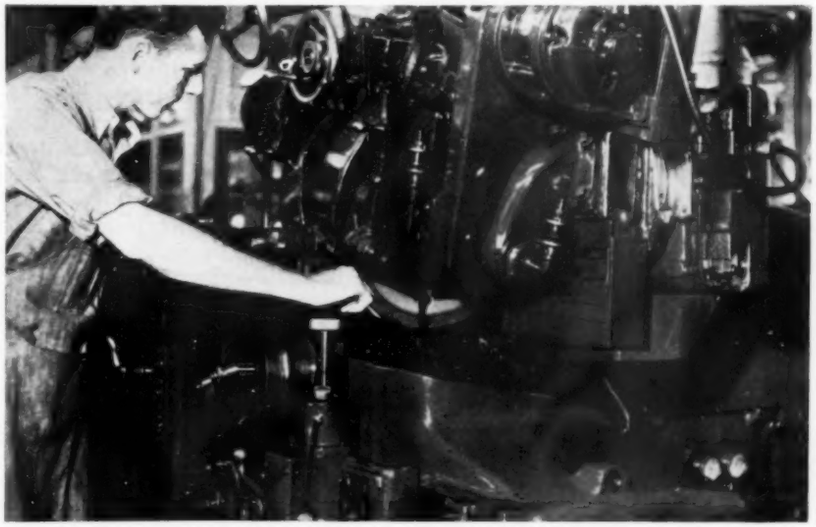
After degreasing, gears and other parts are cleaned of scale in this eight station Bullard-Dunn machine

formance is continually checked by measuring each ear before and after hardening.

Master cards for each gear are filed in the gear laboratory. They record the tool number, pitch size and run-out dimensions for pitch line; start and end of active profile, and start and end of basic profile are also recorded. The master cards permit exact duplication of gears at any time which is essential in an arrangement where gears are handled on a small lot basis. Similarly another card is available in the gear department which gives the arbor tool number, cutter tool number, feed, speed, number of passes and machine for each operation. Since the tools are purchased to the dimensions and shape required for the particular gear and sharpened by the tool room after each job there is no difficulty in duplicating previous work, thus making for flexibility and interchangeability in assembly at all times.

The largest proportion of Kearney & Trecker gears are made of S.A.E. 4615 steel with 6-8 grain size. Only the more important gears or those too large ot be made from bar stock are forged. After the blanks have been rough turned, leaving $\frac{1}{16}$ in. on dia-





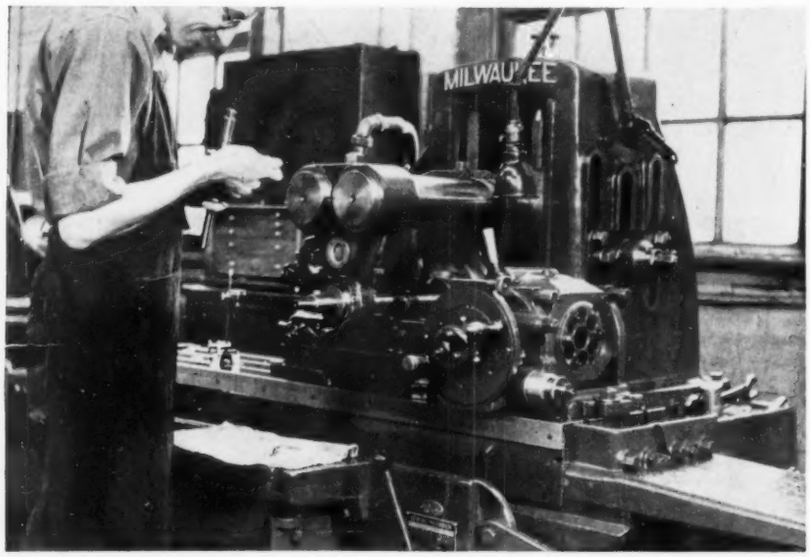
Where distortion in heat-treatment is too great to be corrected by lapping, the final tooth form is ground in this machine using a thread cutting oil

meters for finish turning they are heat-treated instead of normalized as is the usual practice.

A Surface Combustion furnace is used in treating the blanks. They are heated to about 1,700-1,725 F. followed by an oil quench and a draw at 1,000 F. The resultant sorbitic-pearlitic structure machines with a good finish and at the same time is of such nature that later carburizing treatment causes little change. Since the blank assumes a volume and grain structure nearly like that of the carburized gear, later distortion will be minimized. Brinnel hardness of the blanks after this treatment varies between 170-200.

Heat-treated blanks are cut with Kennametal tools to final dimensions for gear cutting operations. Tools are ground with a 12-deg. clearance angle and sufficient positive rake to carry the chips away. Using a cutting speed of 500 to 600 ft. per min. these tools cut 150 pieces per grind as compared to six pieces per grind with high-speed steel tools. Centers are also Kennametal. Soluble oil of 25 to 1 ratio is used for cooling mandrels and lathe centers. Centers are checked three times per day and mandrels each time they are used. Blanks must be finished with face and bore perpendicular with maximum run-out of 0.001 in.

Depending on the type of gear, the teeth will be hobbed or shaped. Those gears which do not distort appreciably are shaved before curburizing after which they are lapped to final form. A gear finishing machine is being added to the production line for crowning spur gear teeth. Teeth are made from 0.0005 to 0.001 in. thinner at ends than at center thus allowing shaft deflection without attendant noise and wear because of edge contact. Where because of unusual shape or other reasons a gear distorts more than a few tenths the teeth are ground in a Pratt & Whitney machine using a thread cutting oil. As much as 0.30 in. over pins may be removed by grinding after which the gears are lapped. Bores of hardened gears are ground in a Bryant chucking grinder. A Blanchard surface grinder is used for those gears which require facing after carburizing. Final inspection of all gears includes 100 per cent roll test on a Brown & Sharpe machine. Gear speeders are being added for inspection use after lapping.



Shafts for gear assemblies are splined in milling machines with dividing head after which they are ground to size. Tolerances on diameters and spline sides will vary from 0.001 in. on large shafts (say 3 in.) to 0.0004–0.0005 in. on small shafts

Carburizing follows the shaving operations on those gears which are not to be ground and follows the hobbing operation on those gears which are to be ground. The gears may be carburized by the pack method or by the gas method. The carburizing temperature is about 1,675 F. The gears are direct quenched in oil, none being press quenched and only a few drawn.

The quenching oil is a mineral oil which is kept sufficiently cool so that the hydrocarbons do not dissociate. The average temperature is about 130 F., kept so by two coolers having capacities of 60 gal. per min. and 90 gal. per min. These coolers consist of copper coil inside a 10-in. water pipe.

A Homo-carb furnace is used for gas carburizing. An asbestos pad is placed between each gear when the bore is to be kept soft in addition to stop-off copper plating.

After heat-treatment oil is removed from the blanks and gears in a degreaser. They are then descaled in an eight-station Bullard-Dunn machine. The stations are: alkali tank, cold water rinse, ten per cent sulphuric acid solution with electrodes for tinning (as soon as the sulphuric acid has cleared the surface of the scale a flash coating of tin forms to prevent further pickling), cold water rinse, alkali tank to remove tin on the parts which are to go to heat-treatment (this tank is skipped by the heat-treated blanks which go to the machine shop), cold water rinse, hot water rinse, unloading station.

Every effort is made to keep the blanks to proper dimension after distortion and growth has been determined. Tools for cutting gear teeth are all designed to allow for change in dimension in carburizing. The pressure angle of gears is always affected in case hardening, then tendency being to grow out at the root of the tooth and to become narrow at the tip of the tooth. This is compensated for by cutting the gear teeth to allow for such changes, which may amount to 0.0005 in. on small gears to 0.001 in. on large gears.

How well growth and distortion effects have been controlled by the dual heat-treatment and by proper co-ordination of cutting dimensions with allowances for changes caused by heat-treatment is demonstrated by the fact that no quenching presses are used. Grinding is used on gear teeth only in those instances where size of gear is such that growth exceeds amount which can be removed by lapping or where shape of gear is such that distortion is of a peculiar nature which lapping will not correct.

When gear blanks are broached, all succeeding operations are located from the root diameter of the spline shaft. Since it is possible to grind this dimension it can be held closely, assuring more accurate gears going to heat-treatment. Sometimes the shape makes it impossible to broach a gear before heat-treatment. For example, a dual gear, one large and the other small, had to be broached after heat-treatment because the heat distorted the smaller gear to such extent that it could not be corrected in later machining operations.

Training makes the foreman

BY GEORGE STUART BRADY

A foreman without training is like a soldier without ammunition. Not much good in a pinch. A good grounding will help him to keep things running smoothly

FOREMEN CONSTITUTE the roots of management in the factory. Upon them devolve not only the details of production, but also the interpretation of management policies to the workers, much of the detailed training of workers and the creation of the spirit that is often the deciding factor in labor policies.

Labor unions have begun to recognize the latent influence of the foremen over the attitude of the workers, and have been making determined efforts during the past year to win over the supervisory staffs. If foremen eventually become locked into the caste system of labor organization, management will lose its chief point of contact with the detailed workings of the plant and it may find its organization approaching the proletarian ideas of Continental Europe where the factory manager has little to say in the operation of the works.

What, then, are the important points in our present foreman training needs? Certainly not training in machine operation. In general, foremen are selected from expert operators, toolmakers and other skilled men. Usually, nowadays, they are men who have had the theory of mechanics at least in night-school courses. But this is not enough. Some of the best mechanically trained supervisors are poorly equipped to be the contact men between management and the workers.

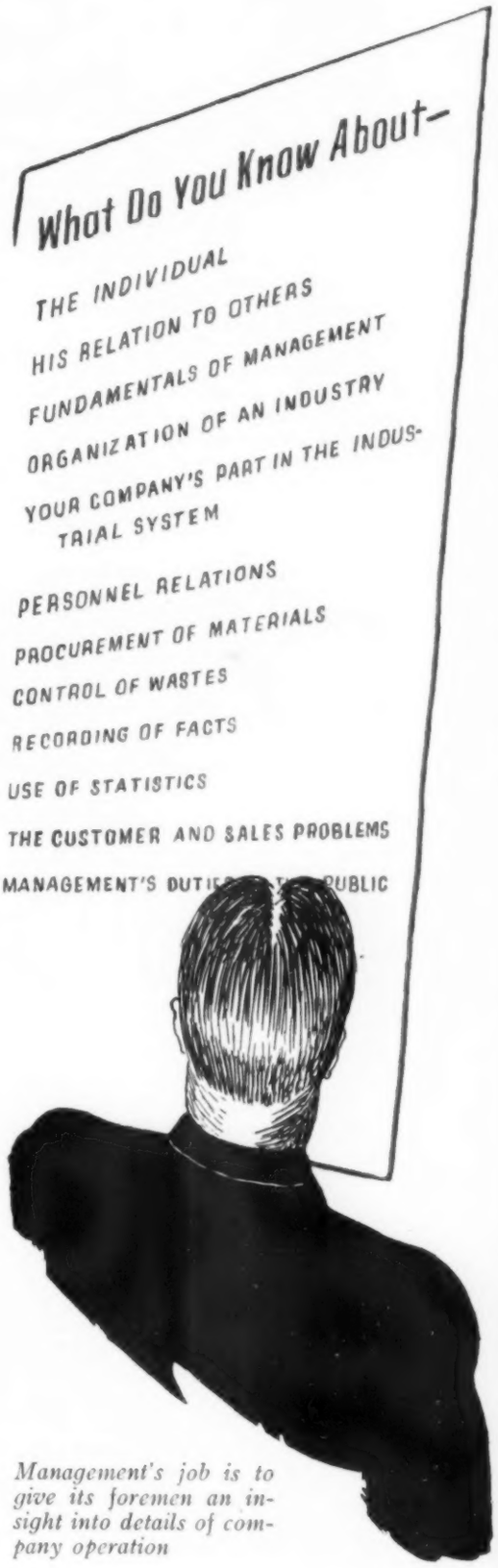
In these days the foreman more than ever before finds that between his men and the management there is an open course over his head which, unless he understands its workings and anticipates events before they happen, is a cause of aggravation that may lead to trouble for himself and the company. He finds that men meet outside and talk intimately about shop conditions with imported organizers who attempt to give dogmatic answers to problems totally unfamiliar to them, not infrequently basing their ideas on wrong slants given them by the men. He cannot attend their meetings, nor can he exert influence on the men which could be taken as company influence. Thus, he sees things carried over his head and brought to the attention of management by outsiders, which he may feel only too late could have been straightened out by himself if he had been given the chance.

Extraneous organization of workers is a product of a feeling by the men that their needs are not being properly interpreted by management. Whether justified or not it must be considered as a lack of trust in the existing avenues of approach to the management. This does not mean that present industrial organizations are wrong, for at this stage of our industrial development their principles are an accumulation of a period reaching back to the very beginning of the industrial era.

One Way To Avoid Trouble

The influence of the foreman as the key contact between all that is represented by capital on the one side and all that is represented by labor on the other, can hardly be exaggerated. In these days, the penalty of setting adrift supervisors who do not have keen insight into both sides of the many problems of industrial organization is possible future labor troubles, unprofitable production, waste and conditions so basically unstable that troubles will brew long before they are observed at the top. Then it may be too late to correct them.

The will to win is the only force that is capable of producing a winning company, but the will to win in the top executives is not sufficient to carry the whole organization to victory. This morale of winning must be coordinated and unified down to the lowest worker. The foreman is the distributing point for that coordination, and it becomes the duty of management to see that he is properly equipped to do the job, not ostenta-



Management's job is to give its foremen an insight into details of company operation

THE OBJECTIVES IN FOREMAN TRAINING

ON THE MANAGEMENT SIDE, THE FOREMAN SHOULD DEVELOP:

1. An ability to interpret the fundamentals of production at a profit
2. A contagious pride in the quality of the product
3. A broad view of management policies and an ability to interpret them naturally, without preaching, to the workers
4. An ability to make the worker "customer conscious"
5. An appreciation of the value of accurate and prompt records.

ON THE WORKERS' SIDE THE FOREMAN MUST:

1. Develop the quality of inspiring team spirit
2. Interpret the workers' needs to the management in an unbiased manner
3. Develop a skill in drawing out ideas from the workers, with a realization that their complaints and dissatisfaction may have their roots in something wrong with the job
4. Learn to plan for smooth action in production to avoid aggravations on the part of the workers
5. Develop an instinct for breaking down jobs into elements to require minimum skill
6. Learn how to instruct men, realizing that the more education and training the men have the more difficult they are to drive but the more easy to lead them and govern with intelligence.

THE FOREMAN'S OWN OBJECTIVES FROM TRAINING ARE:

1. To build for himself a strong, well-operating organization with the minimum of wastage of time, materials, and energy
2. To know how to coordinate his activities with those of the foremen of other departments, neither bossing them nor being subservient to them
3. To gain such a knowledge of the workings of the complete organization and its place in the industrial scheme that he can act positively with the full confidence of the men and of the management, realizing that every reversed decision weakens his position as a leader
4. To so understand the human needs of his men that there will be no cause for obnoxious prying into their private affairs
5. To know how to balance his judgment of the qualities of his workers, so that the men will have an instinctive feeling that each is receiving just treatment in relation to others and relative pay for what he puts into the job
6. To cultivate that discernment that will enable him to balance the jobs in their proper relation to the whole, and to know how to communicate this to the workers and to the management
7. To learn the basic reasons for, and to cultivate and use unostentatiously the four cardinal virtues of prudence, justice, fortitude, and temperance, in all actions dealing with the workers.

tiously by spurts and drives, but naturally in the every-day performance of his tasks.

Only management is really capable of supplying these fundamentals unwarped to the foreman. In the first place, it must come from teachers who have lived the jobs themselves, as workmen, as foremen, and as a part of management. The foreman's clubs in the larger cities are doing a good work in arranging for speakers, experts in various functions, to talk to groups of members. In other places foremen's forums are arranged where topics are discussed by noted men in the lines. But these things are supplemental rather than fundamental.

One of the best methods of approach is through a well-arranged series of instruction periods, each covering a single phase of the material to be given. A start is made on the subject of the human individual, his place as an individual, and his relation to others, leading up to the fundamentals that underlie real executive ability. The ideas follow the basic science of philosophy and logic rather than the exaggerated themes of psychology. This might be termed the philosophic phase. The second is economic, and consists in giving the fundamentals that apply to organizing an industry and the part that one company plays in the industrial system. The remaining phases become gradually more operative, taking up such subjects as personnel, planning for operation and production, procurement of materials and control of wastes, the recording of facts and the use of statistics, the customer and the problems involved in sales, and the general functions of management and its duties to the public.

Practical experience with this kind of instruction, over a period of years and covering nearly 8,000 foreman, has demonstrated that it is possible to include effectively in a one-season course enough of the philosophic and economic fundamentals so that the foreman not only gets a new and wider outlook on his job, but is able to get more out of the group lectures and forums which he attends later. In many cases the individual subjects of the basic training have been taken as group-discussion subjects by foreman of individual plants and factories.

A glance over the above-named objectives in foreman training might give a first impression that the purpose is to make a works-manager or general-manager of the foreman. This, however, is not the case. The object is interpretive. The right kind of training should have as its object the giving to the foreman sufficient of the elements of each phase of the organization, and of the economic and industrial trends, to stimulate his analytic faculties and make him see every job, no matter how obscure, as a vital part of the company organization and with proper setting in the complete industrial system. On the human side it enables him to so interpret these factors to his workers that they too can see their place in the industrial fabric, and instead of making blind alleys of their jobs by locking them into a caste system to gain some immediate advantage, to see them as steps in the advance upward.

The basic training needed to day is to develop second-sight in the foreman, the power to foresee events before they happen, in production, in the use of materials and tools, and in the human aspects that will eliminate the need for outside interference between the men and management.

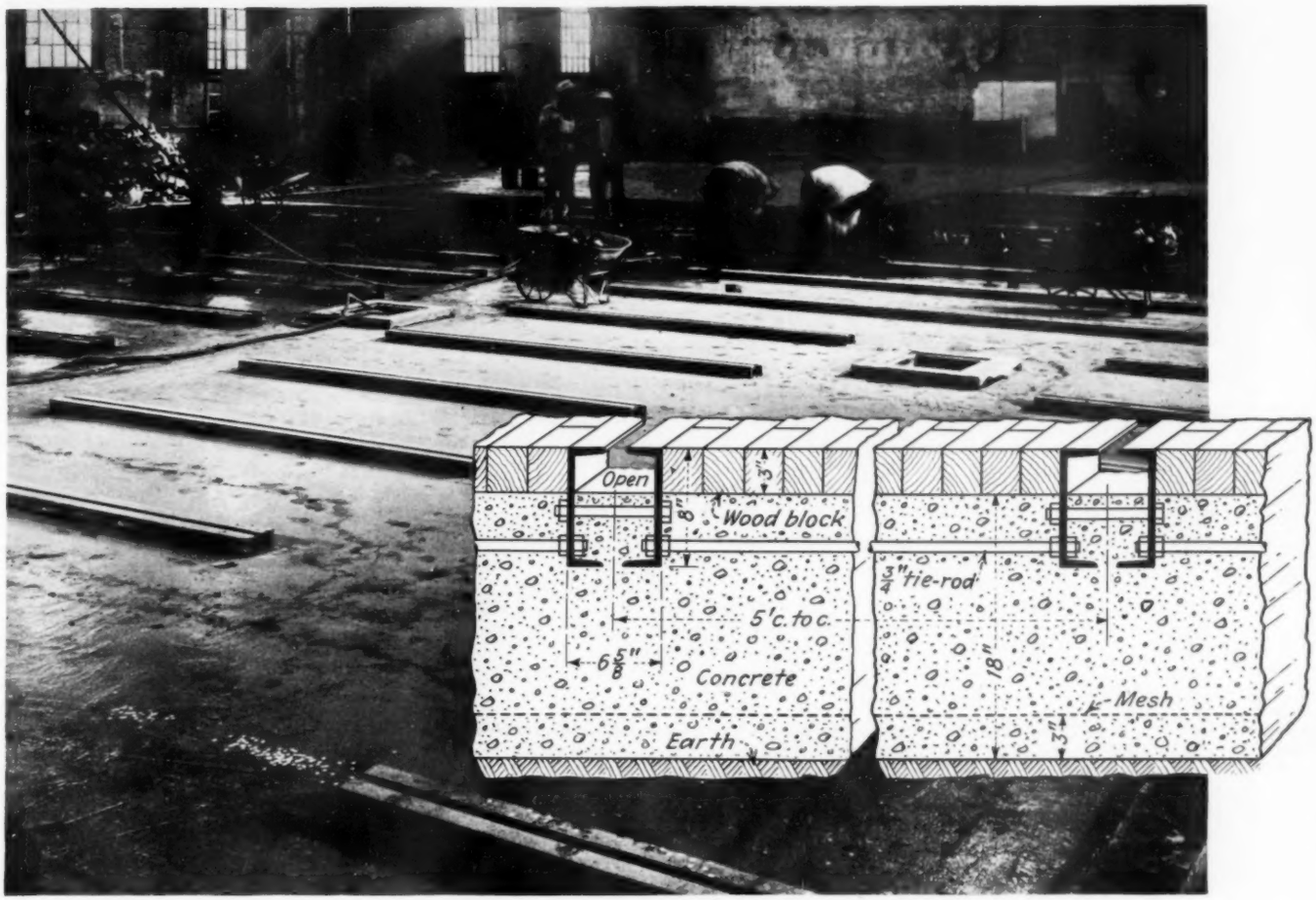
A Three-Legged Stool Never Rocks

By H. M. LANE

IN 1876 my father, J. S. Lane, was attending the Centennial Exposition in Philadelphia. He came to a stand before the exhibit of an engine. The engine had a support under each main bearing of the crank shaft, and a third support under the frame just forward of the cylinder. The frame was a one piece A-shaped casting.

The man in charge, Professor John Sweet, had a neatly trimmed beard and a kindly interested look. He came forward and said, "What can I do for you?"

Father said, "I see you have a three-legged engine, and that reminds me of an argument I had with old Uncle Peter when I was a boy. We had made a steam turbine, and I wanted to put four legs under it, but the old man stood out for three legs. I spent a lot of talk to try to sell my idea. Then he said, 'I have noticed that a three-legged milk stool never rocks.' So the turbine stood on three legs."



When William Sellers & Company turned a foundry into an erecting shop for heavy machines, the floor had to have strength, durability, rigidity and comfort. The construction used gave all four

Floor for 100-ton machines

ERECTING FACILITIES play an important part in the production of heavy machines. Both the erecting floor itself and the equipment for handling heavy units must be adequate. When William Sellers & Company recently converted a foundry building into an erection shop for handling machines weighing up to 100 tons and 70 ft. long, the floor came in for particular attention. The building had a clear span of 76 ft. and two 40-ton cranes. In it would be erected such heavy units as plate planers, turret track turning machines, car and driving wheel lathes, planers up to 72 in., and other large units.

The floor in this shop would have to be kept level and free from vibration. An 18-in. concrete floor was selected. In it 8-in. channels were set in pairs to give T-slots for holding down bolts. These channels extended 3 in. above the concrete, to allow for a wood block floor level with the top of the channels.

A power shovel excavated the floor area to the proper depth and a 6-ton roller was used to insure a solid surface. Because the floor was not designed as a beam, only temperature reinforcement of 6-in. welded wire mesh was needed. This was blocked up 3 in. from the lower surface before the concrete was poured.

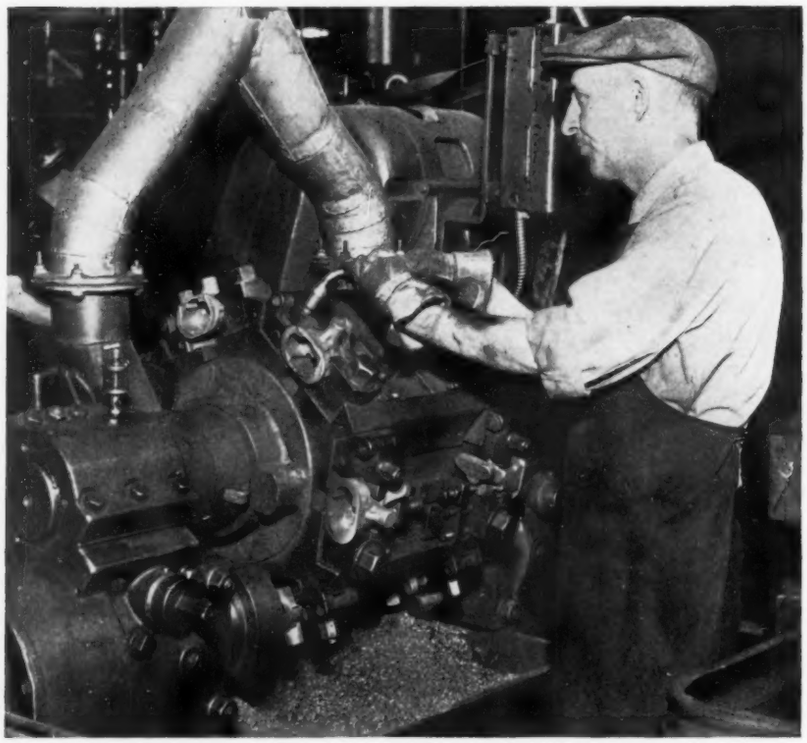
Small concrete piers were constructed to support the channels and to keep them level and in correct position. The concrete was poured in sections not exceeding 32 ft. in either direction, with ½-in. premolded expansion joints between sections. Eighteen-inch curb forms outlined the sections. The concrete used has 2,000 lb. per sq. in. capacity. Channels are 8 in. x 21 ft. and weigh 25 lb. per ft. They were bolted together with separators and the pairs tied together with ¾-in. rods, spaced 5 ft. center to center. Space between flanges was left clear for a depth of 3 in. to accommodate T-bolts. This floor will support a machine weighing 100 tons even if supported at only four points at least 3 ft. apart.

Wood block flooring is of southern yellow pine treated with 6 lb. of Kreolite oil per cu. ft. It will sustain static loads up to 90 tons per sq. ft. Block flooring can be taken up and replaced easily, does not damage tools or parts dropped by accident, has long life, is easy on the feet and warm.

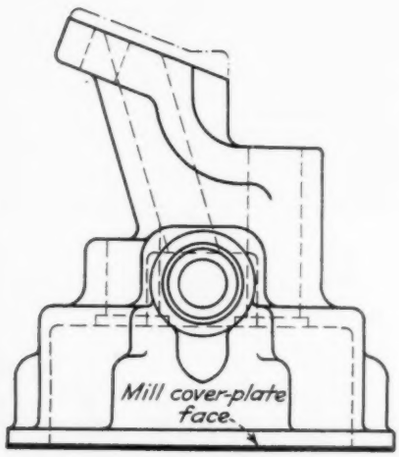
Dust-free cuts on cast iron

THE MACHINING of Buick oil-pump bodies is a good example of operating efficiency combined with operator's comfort. As in most cases when cast iron is cut at high speeds the chips are accompanied by fine particles of dust and graphite. These are exhausted by a duct system with pick-up vents located adjacent to the cutting tools; thus the air surrounding the machine is kept clean.

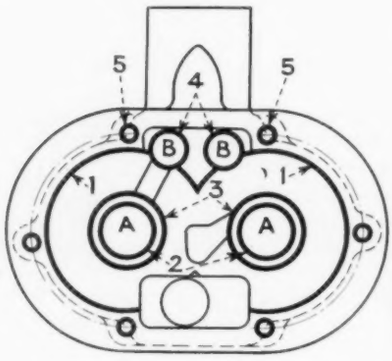
Using station-type equipment, an unusual combination of multi-operation machine set-ups has reduced costs, speeded production and improved the quality of work compared with previous methods. The illustrations show the sequence of operations.

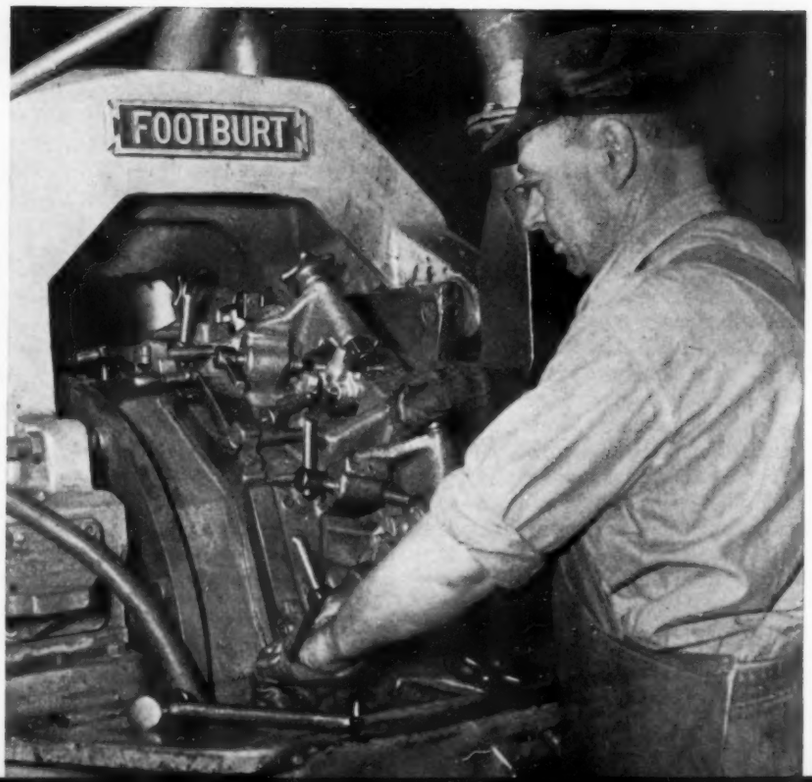


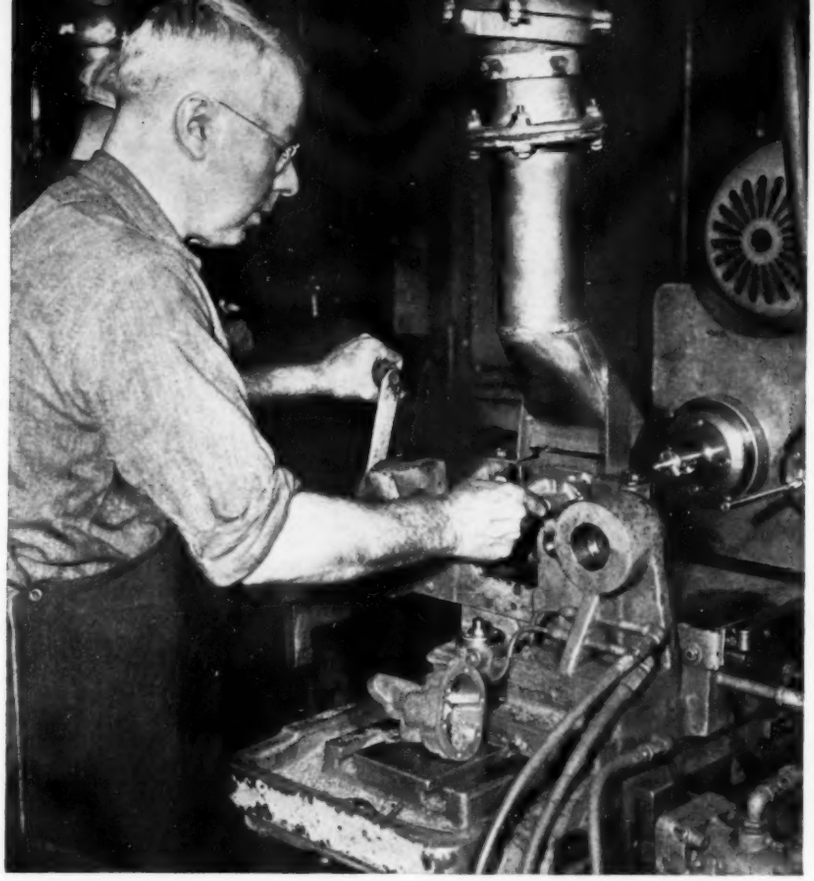
FIRST SET-UP. A double-end Ingersoll trunnion-type machine rough and finish mills the cover-plate face of the oil-pump body. Each end of the machine has two spindles.

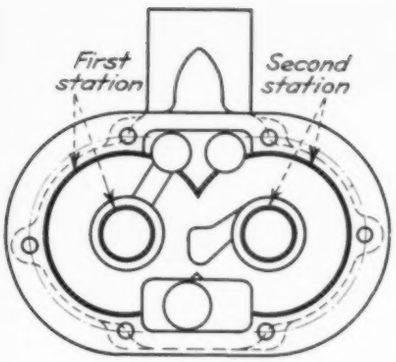


SECOND SET-UP. A single-end trunnion-type Footburt combines several operations, which are all done from the cover-plate side of the piece: (1) rough and semi-finish bore both chambers, (2) drill and ream the shaft and stud holes *A*, (3) counterbore those holes, (4) drill two oil-gallery holes *B*, and (5) drill and chamfer six cover-plate holes.

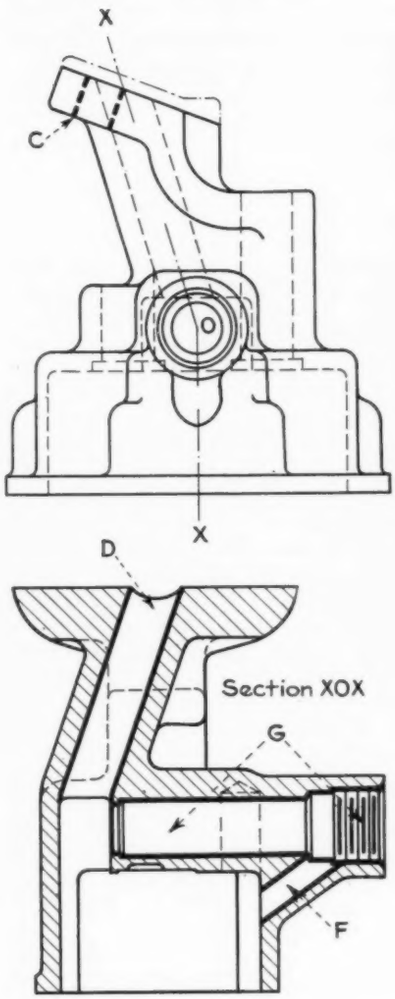


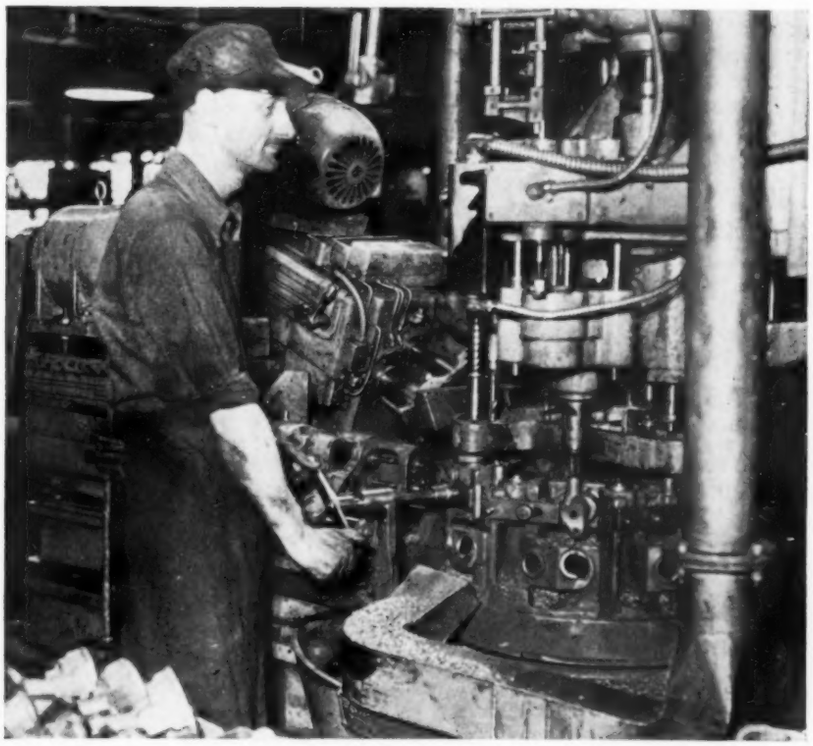






THIRD SET-UP. Both chambers and both holes *A* are finished on a double-spindle Ex-Cell-O which goes through the complete cycle, including indexing to the two spindles and returning to loading position, without attention of the operator. At the first station the stud hole is bored and the stud-hole chamber is precision bored and faced. The second station does the same for the shaft hole and chamber, but here the boring bar has an outboard ball-bearing support.





FIFTH SET-UP. (The fourth set-up, an intermediate operation, consists of milling the pedestal face)—A six-head station-type Ex-Cell-O with an eight-fixture indexing table performs these operations: (1) The first head drills two fastening holes *C* in the pedestal, (2) the next two heads step drill the $2\frac{3}{4}$ in. long hole *D* from the pedestal to the valve chamber, (3) the fourth head drills an angular hole *F* from the valve chamber to the valve hole, and (4) the fifth and sixth heads drill, counterbore, tap and face the ball-check valve hole *G*. Tapping the cover-plate holes on an upright machine completes the oil-pump body.

How to hold the work

BY J. R. LONGSTREET AND W. K. BAILEY THE WARNER & SWASEY COMPANY

Work held accurately can be finished accurately—if held rigidly it can be machined with proper speeds and feeds

MOST TURRET LATHE WORK can be done with standard collets or chucks, but it sometimes is necessary to provide special arrangements for holding irregularly shaped pieces. Special jaws often can be used to advantage in standard chucks. For holding bar work, the collet chuck has been accepted as standard equipment. The three- or four-jaw chuck usually is standard for chucking work. Collets and chucks are made in various styles, types and sizes; proper selection is important.

Collet chucks used for smaller sizes of bar stock—up to 2½-in. diameter—are of the spring collet type. For larger sizes of bar stock, collet chucks usually are of the parallel closing type. With both types of collets the bar stock can be fed through without stopping the spindle. Since most bar stock is smaller than 2½ in., the spring type of collet is the most common.

A bar chuck of the parallel closing collet type is shown in Fig. 7. Various sizes of round, square and hexagon bushings are made to fit the master jaws. For heavy-duty work, for close-to-capacity sizes, and for special shapes and sizes, solid jaws are used. Round bushings or solid jaws above 2½-in. diameter are corrugated to insure a firm grip on the bar stock. The parallel closing chuck is adjusted by means of a nut. Range of this adjustment is about $\frac{1}{16}$ in. above and below the standard size, or $\frac{1}{8}$ in. total adjustment. One of the basic reasons for the use of this type of chuck is that it permits a larger range of adjustment to accommodate greater variations in bar diameters. Large bars usually are hot rolled and vary in diameter more than small cold-finished bars. This type of chuck should be used for first operation work when gripping on the rough bar. For second operation work, when the concentricity from first to second operations must be within 0.005 in., spring-type collets should be used.

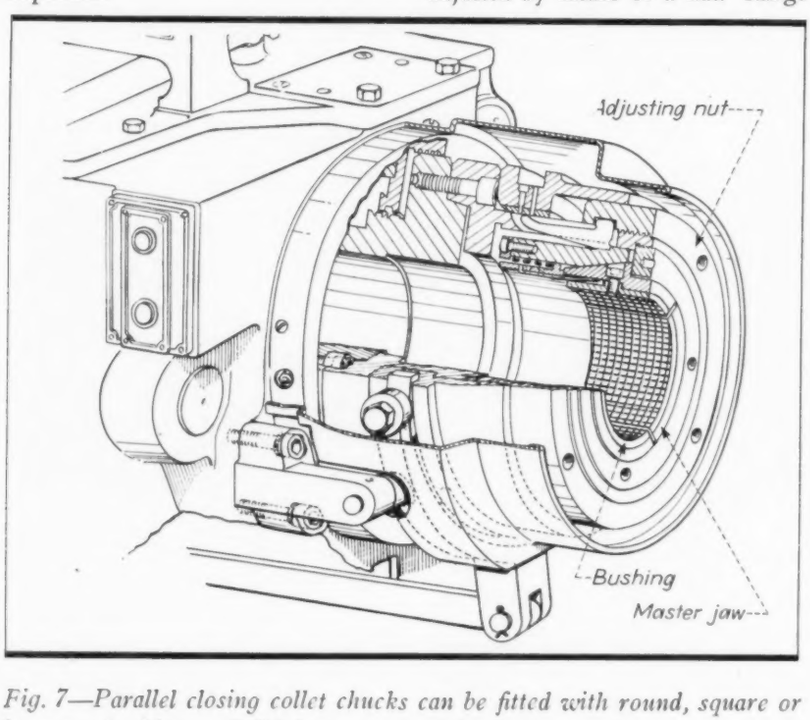


Fig. 7—Parallel closing collet chucks can be fitted with round, square or hexagon bushings. Solid jaws are used for heavy work

Spring collets are of three types: pushout, drawback, and stationary. The first two types are similar in operation. Fig. 8 shows the pushout type; here the plunger, when moved to the right, forces the partially split tapered end of the collet into the taper of the hood, which causes the collet to tighten around the stock. The hood is screwed on a threaded-type spindle or, in the case of a flanged-type spindle, is bolted to the face of the spindle. The drawback type collet, Fig. 9, operates in the same way, except that the collet is drawn back against the tapered hood for tightening.

With either the pushout or drawback collet there is a slight movement of the stock, becauses the collet moves as it is tightened. In most cases this movement does not affect the job, but on some second operation work where accurate lengths are to be held in relation to previously machined shoulders the stationary type collet, Fig. 10, provides a more accurate endwise location. The collet and plunger sleeve are tapered, and the collet is held in place by the shoulder on the collet which comes against the hood. This collet will

From a forthcoming book on turret lathe tooling.

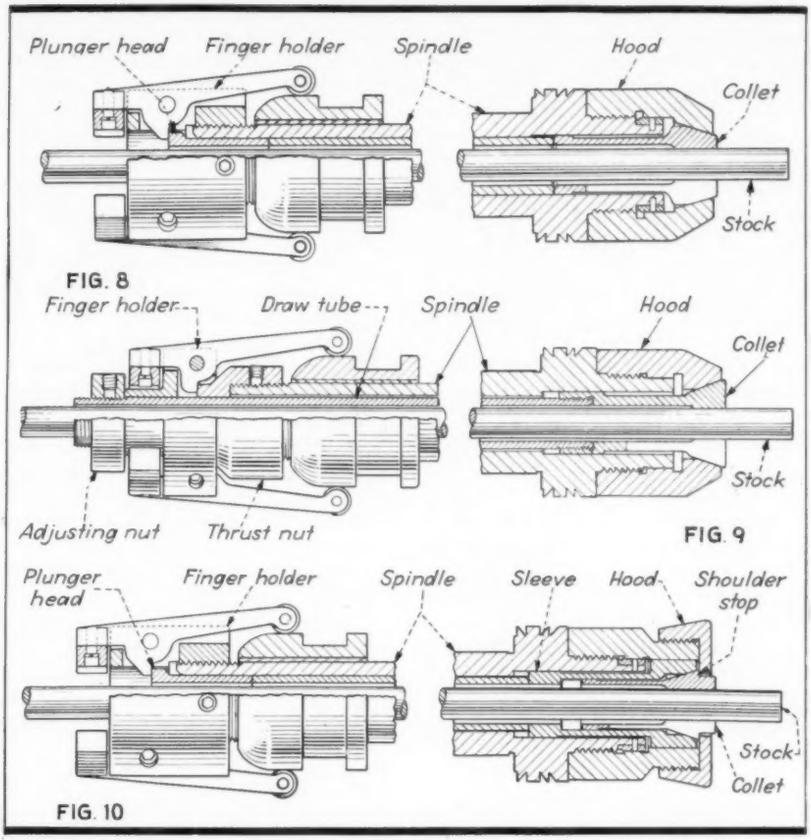


Fig. 8—In the pushout type collet the plunger forces the collet into the hood, which causes the collet to tighten around the stock. Fig. 9—The drawback type spring collet operates in the same way, except that the collet is drawn back against the tapered hood. Fig. 10—The stationary type collet provides accurate endwise location, but is not as accurate from the standpoint of concentricity

work more accurately endwise, but because of the increased number of sliding surfaces and fits it is not as accurate from the standpoint of concentricity, as either the pushout or the drawback spring-type collet.

All of the spring type collets discussed so far are of the solid type. Each collet holds one size of stock only. There is, of course, a range of adjustment by means of the finger holder which is threaded to the rear end of the spindle. These collets can be adjusted about $\frac{1}{64}$ in. above and below standard size, a total adjustment of $\frac{1}{32}$ in.

The three spring type collets—pushout, drawback and stationary—are made as master collets for larger size machines. Into these master collets are fitted bushings for holding round, square, hexagon or special shapes. Bushings also may be corrugated to withstand the heavy end pressure of drilling, slab facing or counterboring.

When collets of either the solid or master type are used for short work that is larger in diameter than the bar capacity of the machine, extra capacity collets are used. These move endwise in closing and variations in diameter will affect the endwise location of the work. Where accurate endwise location from a previously finished surface is important on second operation work, or where on first operations on castings there is very little stock allowed, the drawback extra-capacity collet, Fig. 11, has the advantage of providing accurate endwise location.

When pushout collets are employed for second operation work, back stops frequently are usesd. In Fig. 12 are shown both solid and adjustable types of stops. The stop is held between the operating plunger and the collet, and the work is pushed into the collet until it strikes the stop. When using a standard pushout collet with a stop, be sure that the flange of the stop is slightly smaller than the bore of the spindle. The shoulder of the flange should have a sliding fit in the heel of the collet. The flange of the stop should be $\frac{1}{8}$ to $\frac{3}{16}$ in. thick and, for accuracy, its sides must be flat and parallel.

The accuracy of the spring-type collet chuck depends upon the collet, the head, the spindle, and the plunger. The collet must have its heel diameter, taper nose and bore ground concentric after hardening. The back of the heel must be ground square with the bore. The hood should also be hardened and must have its taper nose, pilot, thread and shoulder ground concentric to each other and to a close fit on the spindle nose. The spindle nose diameter, pilot and bore must be concentric and finished to an accurate size. Also, it is im-

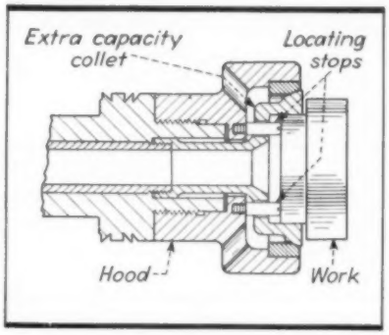


Fig. 11—The drawback extra-capacity collet provides accurate endwise location of the work piece

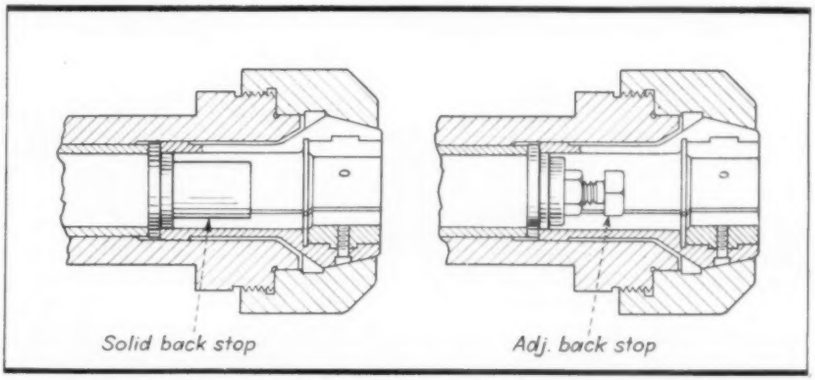


Fig. 12—Both solid and adjustable types of end stops are used for second operation work. The stop is held between the plunger and the collet

portant that the plunger seats squarely on the back face of the collet.

In addition to the collet chucks already mentioned, several chuck manufacturers offer power-operated collet chucks. These are actuated by air or hydraulic cylinders, or by electric motors mounted on the back end of the spindle. They are used for high-production jobs on second-operation work, or on first operation work which has a smooth, uniform surface to be chucked. Many aluminum and brass forgings, and some die castings, are sufficiently smooth and uniform in size to be gripped in power-operated collet chucks.

Three Types of Arbors

Although arbors are not used for holding bar stock, they are taken up here because they are operated by the same mechanism as spring-type collet chucks. There are three types of arbors: (1) expanding bushing type, (2) expanding plug type, and (3) threaded arbors. All of these can be mounted on either the plain or adjustable type of adapter hood. When accuracy is required, the adjustable adapter hood provides a means of accurately aligning the adapter with the spindle.

With the expanding bushing type arbor, Fig. 13, the work *A* is fitted against the stop plate *B*. As the drawrod *C* is pulled back, the expanding split bushing *D* climbs the taper of the arbor body until it expands enough to grip the work tightly. The bushing on this type of arbor grips the work over its entire length, even when there are slight variations in size. This type is suited for larger diameters, for roughing work, and when power is required rather than extreme accuracy.

In the expanding plug type arbor, such as shown in Fig. 14, work *A* is fitted against stop plate *B* and, as drawrod *C*, is pulled back, the partially split plug *D* is forced to expand at its outer end until it grips the work securely. The arbor actually grips the work only at the outer end of the plug. This arbor is best for light finishing cuts where accuracy rather than power is required.

Work previously threaded is screwed onto the threaded-type arbor when the collet chuck lever is in the closed position. Pressure of the cut tightens the piece. To remove the piece, the draw tube is released and the work unscrewed easily. In Fig. 15 the adapter hood *A* supports a specially made arbor body *B*. In the drawback type unit (above) for holding on a female thread, the work *C* is screwed to the drawback plug *D* against the arbor body. In the pushout type unit (below) for male threaded work, the piece *C* is screwed into the arbor body *B* until it strikes the plug *D*. Designs of a drawback unit for male threaded work and a pushout unit for female threaded work also are shown.

Power operated threaded arbors are used for high-production work because they are faster and easier to operate. Such arbors should be fitted with a locking mechanism to prevent the piece from jamming on the arbor under pressure of the cut. This difficulty is not encountered when using the drawback or pushout collet mechanism because the finger holders which operate these units lock themselves into position.

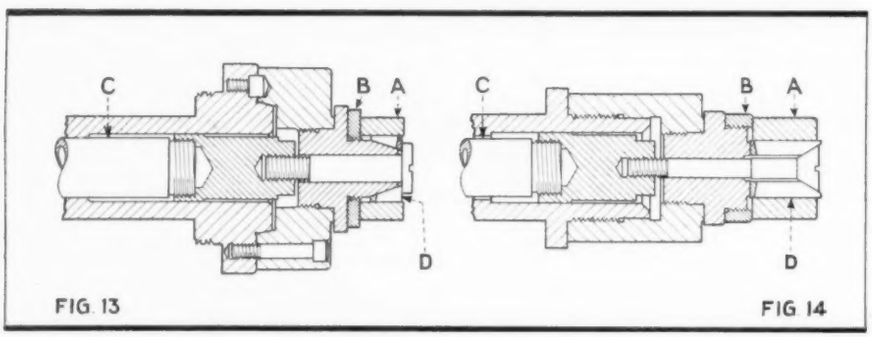


FIG 13 FIG 14

Fig. 13—The expanding bushing arbor grips the work over its entire length. It is best for roughing operations. Fig. 14—The expanding plug arbor grips the work only at the outer end of the plug. This type is best for light finishing cuts where accuracy is required

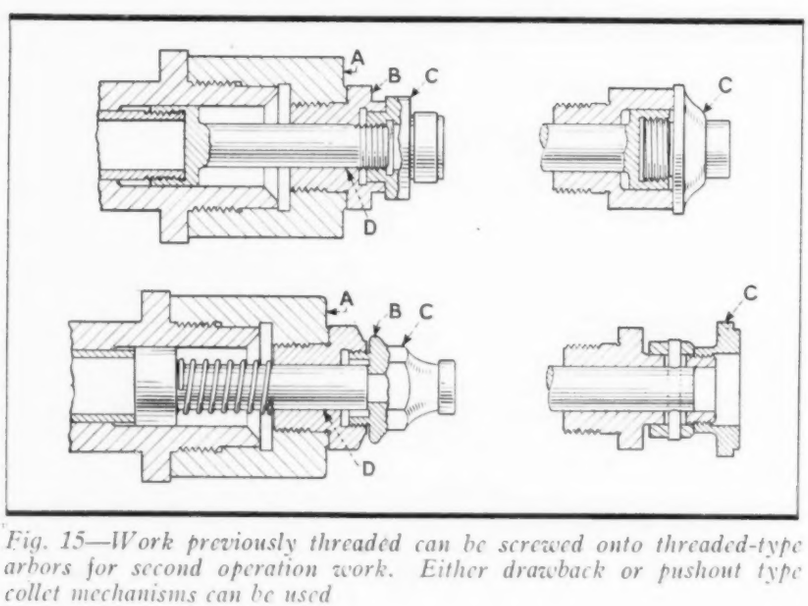


Fig. 15—Work previously threaded can be screwed onto threaded-type arbors for second operation work. Either drawback or pushout type collet mechanisms can be used

Machine Shop Training

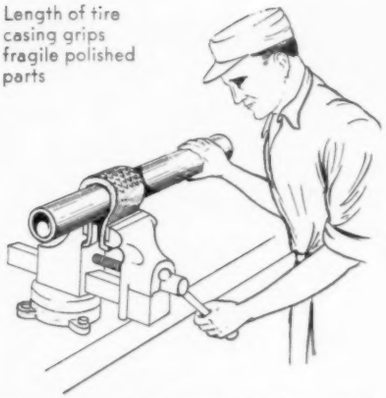
By A. W. FORBES

Is Mr. Williams' comparison of trade school graduates with farm boys (*AM*—Vol. 83, page 323) fair to the trade schools? Mr. Williams states that farm boys taken into the shop have, within a few months, surpassed trade-school graduates and apprentices who have completed successfully a four-year shop training course. But why shouldn't they? A modern farm has machinery and tools. The farm boy learns to handle and repair such equipment, thereby gaining at an early age experience not available to boys who enter trade schools and shops for elementary training.

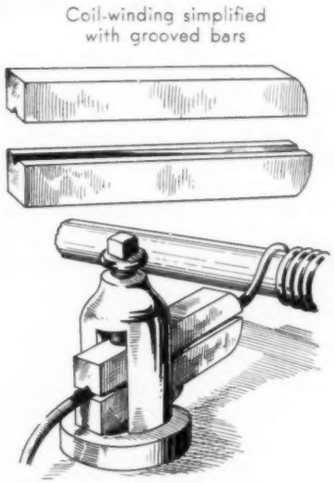
No trade school, no matter how well managed, can give a mechanical training equivalent to that obtainable by a boy on a modern farm. The 15-year-old boy, whom Mr. Williams mentioned, undoubtedly has had a number of years experience in the line of work in which he was successful, not the three months for which Mr. Williams gives him credit. City boys usually do not have such advantages.

SHORT CUTS FOR THE SMALL SHOP

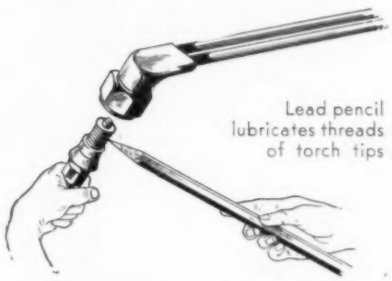
BY A. H. WAYCHOFF



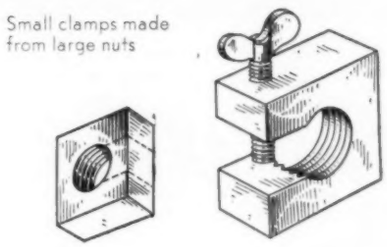
TO HOLD POLISHED, FLIMSY TUBING without collapsing the walls or marring the surface has always been something of a problem. If the work's the right size, a length of old auto tire casing is just the right answer. Simply wrap it around the work and fit the bead strips in the vise jaws and tighten it up. The rubber will grip the tubing tightly, but without the usual marring or crushing, since the pressure is distributed evenly. This trick works fine on wooden and fiber tubes, too.



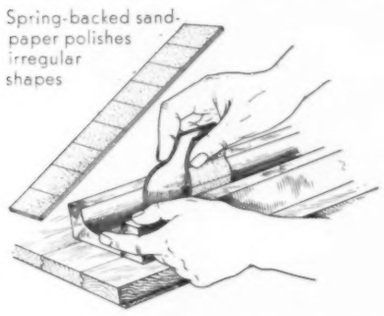
A COUPLE OF STEEL BARS, grooved as indicated, are a big help in winding all sorts of coils and springs on a lathe. They should be about the same length and width as an ordinary lathe toolholder, and a little less than half as thick. Each is given a little bevel on one end and the grooves filed or plowed down the center of one edge. The mandrel can be any piece of iron or steel having an outside diameter the same as the inside diameter of the spring. The spacing of the coils is determined by the speed of the lead screw, the same as when cutting threads, and the tension on the wire is easily regulated by the toolpost screw. With this set-up, any lathe operater can quickly make accurate open or closed coils from almost any size and kind of wire.



IT TAKES ONLY A MINUTE to draw the point of a soft lead pencil around the threads, before screwing a new tip into the welding torch. When screwed tight the tip won't leak a bit, but will still come off easily even after many hours of use without having to use a big wrench with danger of cracking the head

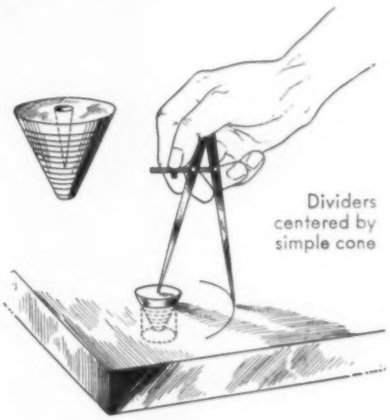


STRONG LITTLE C-CLAMPS can be made from large nuts with little bother. Just saw out one side, in line with the top and the botton of the hole, and then drill and tap for a small thumb screw as shown. Unlike most of the tiny C-clamps on the market, this kind will stand up under the severest use. A set of them will prove one of the most useful kind of gadget you can get hold of.

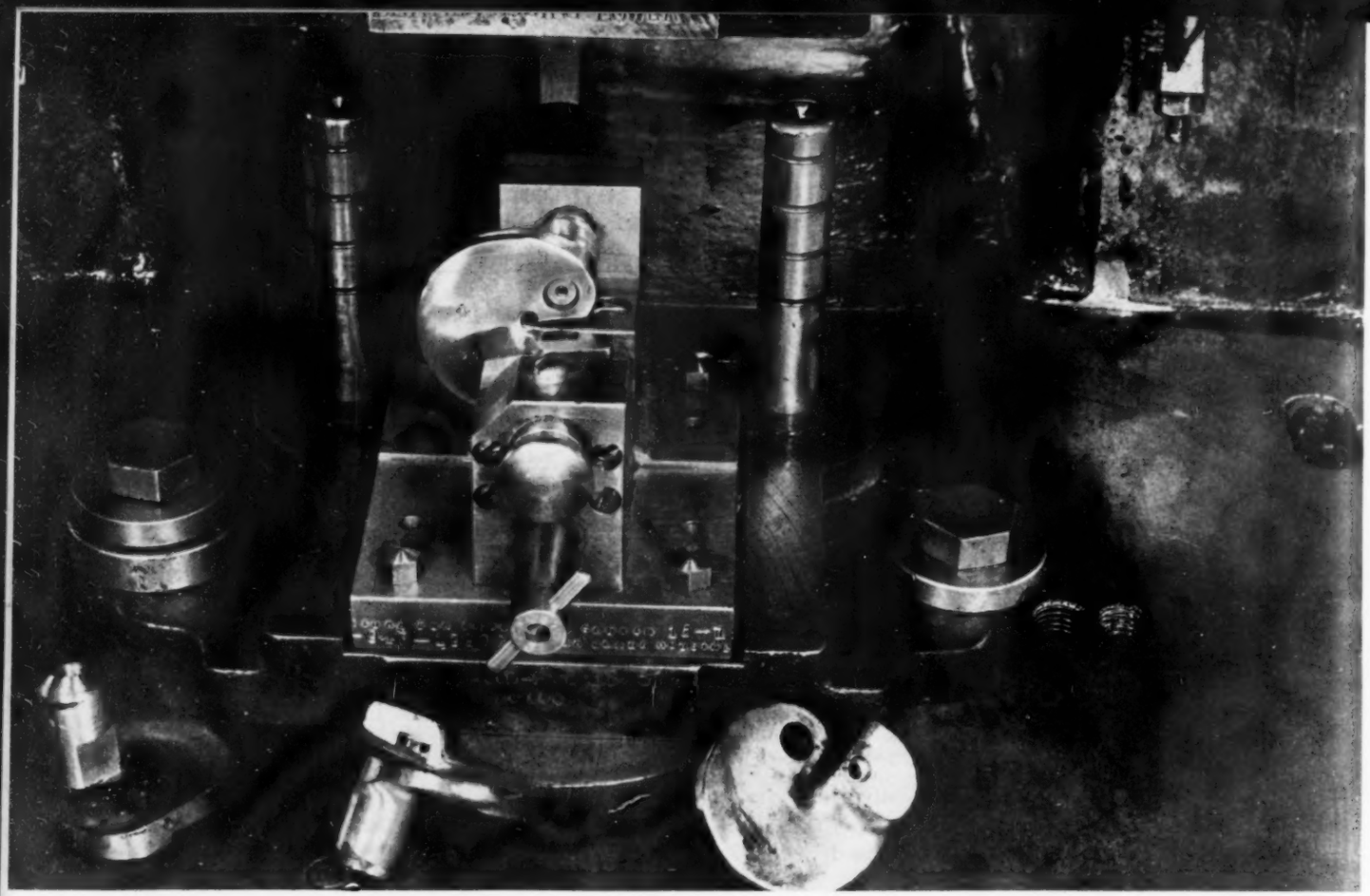


FOR INTRICATE SANDING this spring sandpaper device will be found mighty useful. It's made from a length of phonograph motor spring, about an inch and a half wide and a foot or so long. Small pieces of sandpaper, the width of the spring and about an inch long, are cemented to the strip with their edges nearly touching. This way the spring will bend into almost any shape. On one side you could have coarse sandpaper and on the other fine, or maybe emery cloth instead.

A HARDWOOD BLOCK is one tool common to every shop, large or small. It makes a swell punch pad but every time the punch is driven through the metal it mars the block and before long it's so ragged that perfect holes are impossible. If you get an old auto tire casing that's been worn smooth and nail a piece of it onto the end of the block, you'll find the punch will make as clean holes as it did on the block itself without making a hole in the casing. A block fixed this way will last many times as long as one with no protection.



A SMALL CONE like the one shown in the sketch comes in mighty handy for centering dividers in large holes. It can be made from a piece of hardwood, but is better when turned from iron or steel. It should be about an inch in diameter at the large end and about an inch long. In the center a small hole is drilled about half an inch deep. The cone is self centering in the hole in the work, and some rings scribed around the outside help keep it true.



Position of the angular slot which holds the fixed shear blade is such that it is impossible to produce by milling, hence it must be sheared from the solid after the hole at the bottom has been drilled

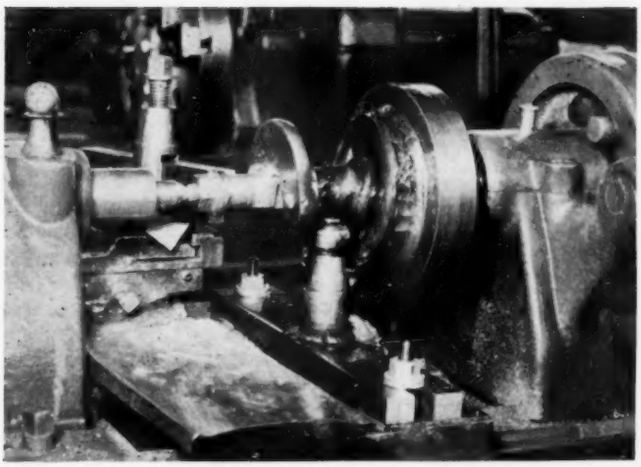
Where

Black & Decker found the way to make an odd-shaped part. Two forgings are partially machined, joined by welding and then finished

Two forgings of S.A.E. 3250 steel are joined by welding to form this shear blade housing

BECAUSE OF THE PRESSURES involved when using the portable electric shear made by Black & Decker, it was necessary to make the blade housing of drop forgings. Two forgings are used instead of one, because of the difficulty of machining a part of this shape when made as one piece. In this shear, the fixed blade is mounted in a horizontal slot in the lower portion of the housing, while the reciprocating blade moves up and down in a 0.625-in. diameter reamed hole. Both of these blades are removable for sharpening.

Both forgings for the housing are made of S.A.E. 3250 steel, the two units being joined by welding in a specially developed fixture. The lower



A face-cam controls the longitudinal motion of the cutting tool when turning the helix on the lower section of the housing

To complete the housing the upper and lower forgings, which have been partly machined, are joined by oxy-acetylene welding in a simple fixture

welding aids machining

BY HERBERT CHASE

portion of the housing has a helix-shaped flange, as shown. Forgings for this lower end, as received from the outside supplier, are first annealed, then the outside is rough ground on a belt sander. Next, the forging is chucked in a Warner & Swasey turret lathe and the 0.500-in. diameter flat-bottomed hole is drilled and reamed, and the face and outside diameters are rough turned. These operations require about six minutes.

To true the bottom face with the hole, the forging is mounted on a mandrel and the face is ground. Other operations performed on this piece are: (1) drill all other holes, (2) tap two holes, (3) mill $1\frac{5}{32}$-in. dimension, (4) rough mill flats on boss, (5) mill excess metal from radius, (6) turn helix on lathe, (7) file and sand remaining unfinished surfaces on belt sander, (8) rough mill blade slot, and (9) finish shear $\frac{1}{2}$-in. blade slot.

The last mentioned operation is necessary because the angular position of the slot is such that it is impossible to finish the slot by milling. During this operation the piece is held in the fixture with the bore piloted on a pin at the back. This is a rapid operation and the time consumed is chiefly that required for putting the piece into and removing it from the fixture.

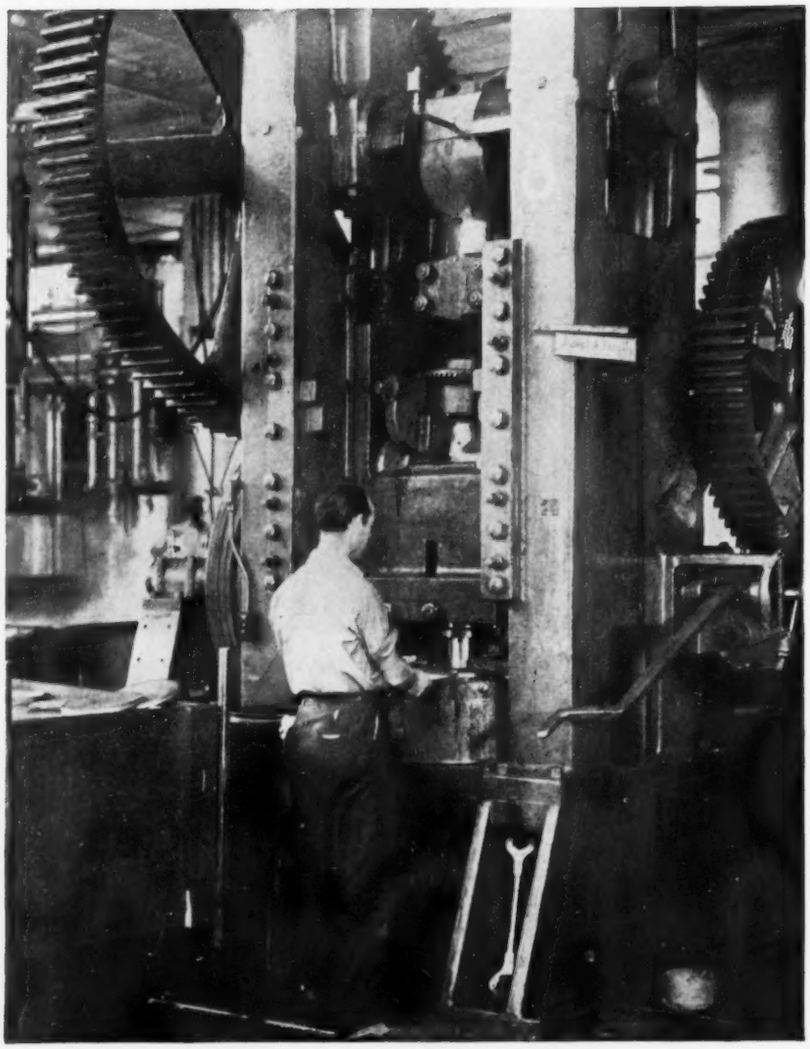
To complete the shear blade housing, a blank for the upper end is turned in a screw machine. This operation includes the turning of a flange about midway of the tubular portion, the lower end of which is beveled to match the upper end of the drop forging referred to above. These two parts then are placed on a spud in a welding fixture, the beveled ends forming a V-groove which is filled by oxy-acetylene welding as the piece is turned by hand.

After welding, the housing is normalized, then chucked in a Warner & Swasey lathe where the throat diameter and flange are turned. Also, the flanged end is counterbored. These operations require about eight minutes. The piece then is turned end for end and the hole is bored and reamed in about ten minutes.

Above the upper flange is a portion of the tube which, in subsequent assembly with the rest of the shear, is recessed into the casting to which the housing is fastened by screws. After grinding the outside diameter of this tube extension, a flat is milled, leaving flat surfaces to serve as guides for the slide surfaces of the scotch yoke used to reciprocate the vertical blade. Milling of this slot requires only $2\frac{3}{4}$ min., after which a flat is milled at the lower portion of the throat and a radius is milled on the flat. A $\frac{9}{16}$-in. slot for the movable blade then is milled in the lower end of the throat, after which four holes are drilled in the upper flange. Burring and sanding operations prepare the piece for heat treatment.

Following heat-treatment, each housing is sand-blasted and brushed, as a preliminary to bluing, which gives a workmanlike finish. Following the bluing operation, the 0.937 in. diameter and face at the upper end are ground, then the 0.625-in. diameter hole is internally ground. This completes the machining operations except for retapping the holes for attaching and adjusting screws for the fixed blade.

Every shell needs a case

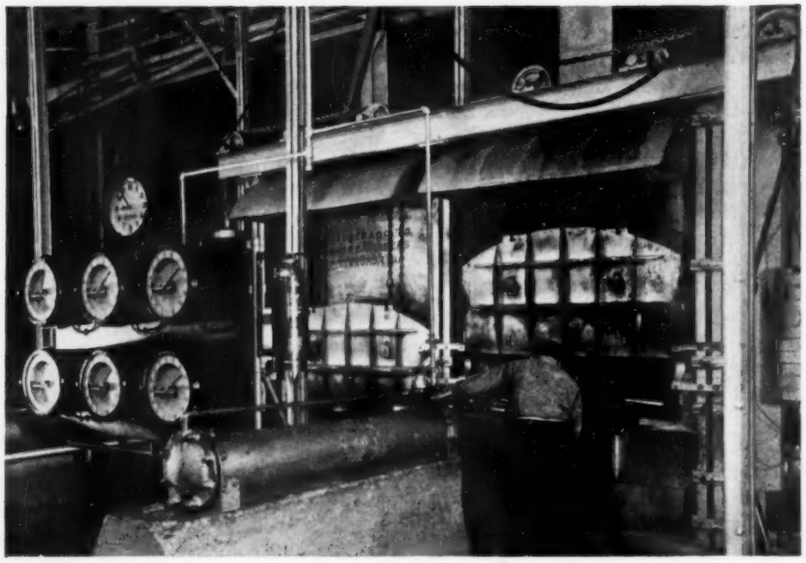


When planning a manufacturing set-up for ammunition, all components of the round must be considered. Here we get down to cases

FRANKFORD ARSENAL'S new method of making medium-caliber artillery shells was cited recently in these pages as an outstanding contribution of the Ordnance Department to the program of national preparedness (*AM*—Vol. 83, page 943).

The shell is only one component of a round of ammunition. Other mechanical parts are the cartridge case, the fuze and the primer. Obviously no plan of manufacturing progress is complete unless operations on all parts are analyzed and improved. Well aware of this fact, the Ordnance

Cartridge-brass disks (70 per cent copper, 30 zinc) are cupped on a 350-ton Bliss press. Punch and die are chromium plated to give a longer life. On this and other press operations, machines with excess capacity are used. Heavy repetitive work is naturally hard on the equipment. The use of oversized machines results in low maintenance and greater adaptability for a variety of work



After cupping and after each drawing operation, except the last, the cases are annealed, pickled and washed. Annealing is done in gas-fired Tate-Jones and Lindberg batch-type furnaces. Gas flames under the trays at the furnace entrance preheat the work. Then the cases are pushed into the heating chamber by pneumatic pistons. Leeds & Northrup pyrometers record temperatures at three positions in each furnace.

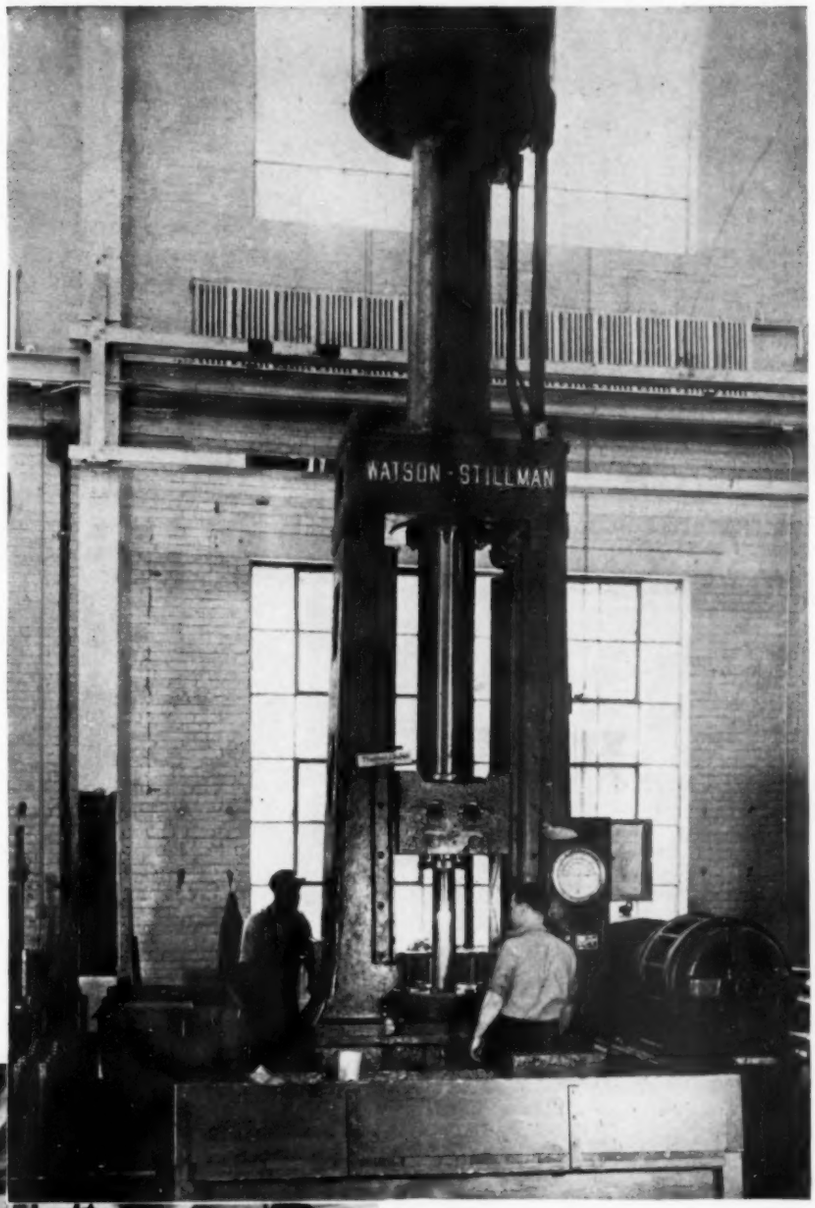
personnel has paralleled development of methods on the shell with forward steps on other parts. This article deals with the cartridge case.

The case holds the propellent charge of powder, and when the gun is fired, must prevent the escape of gases through the breech. To thus deliver the full propulsive force to the base of the projectile, the case must be held within close limits of hardness and manufacturing dimensions. Frankford's means of obtaining these objectives are shown on this and the following pages.

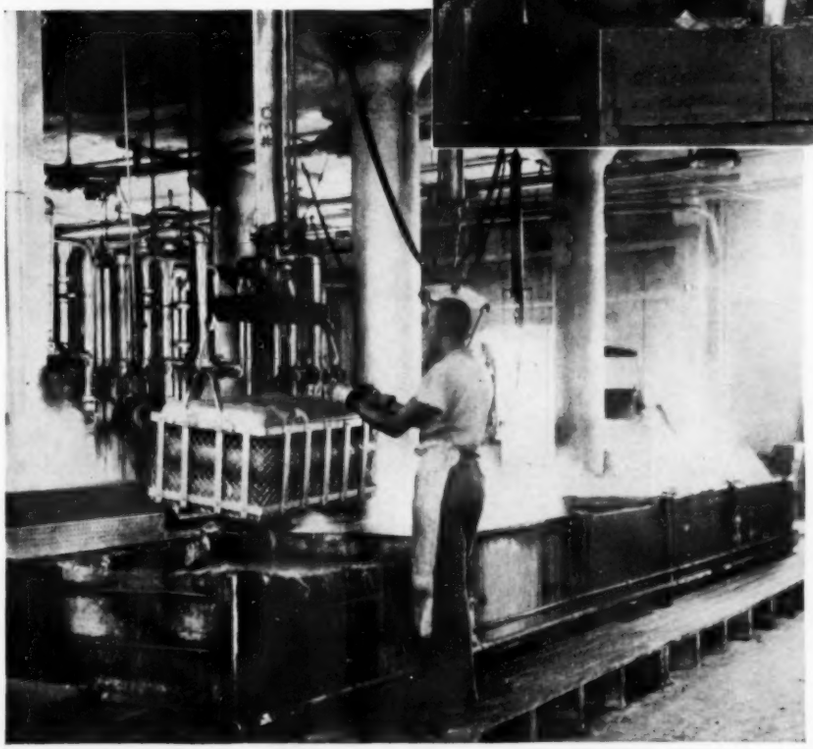
Tools Have Long Life

Close attention has been given to the tooling used. For instance, during the past year, cemented carbides have been adopted for certain drawing dies. The relatively high first cost is more than offset by added life, expense of regrinding and a reduction in the down time of the presses.

Tool steel punches on some operations are chromium plated for the same purpose and to provide a smooth surface over which the drawn metal can pass. Studies of metal flow have led to the selection of punch clearances and other phases of die design that have resulted in a reduction in



Shells of this size are given four draws. The third draw is done in a 200-ton Watson-Stillman hydraulic press. Modern presses of this type reduce non-productive portions of the stroke to a minimum, having return speeds up to 100 ft. per min. Drawing speeds range from 25 to 35 ft. After the final draw the rough edge is trimmed off

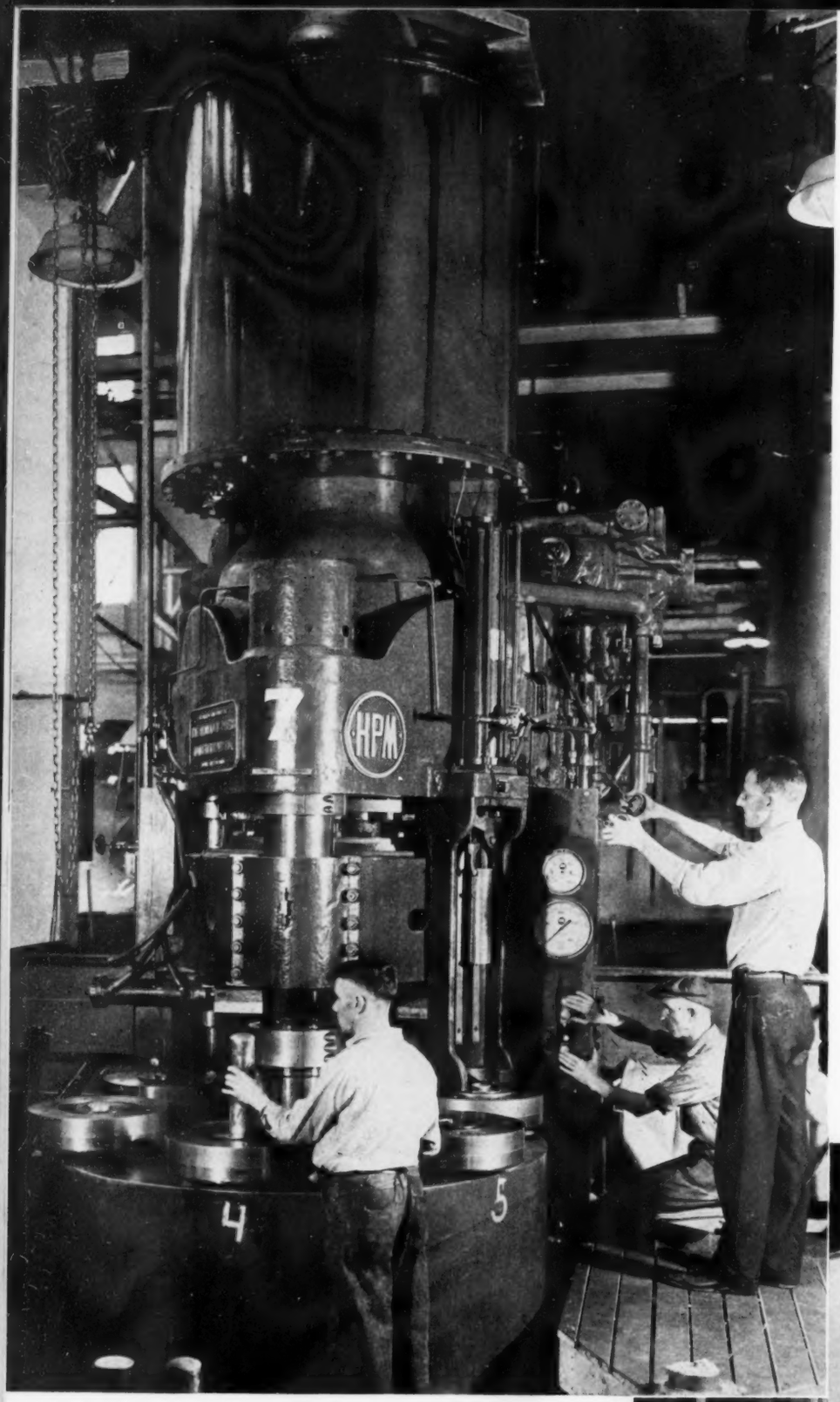


Cases emerging from the furnace are water quenched by an overhead spray nozzle. They are then pickled (as shown) in a 5 per cent sulphuric acid solution for 7-8 min., using Monel metal trays, given a cold rinse, washed in soap solution and then hot rinsed. This procedure follows each annealing

the number of steps needed to produce a given case.

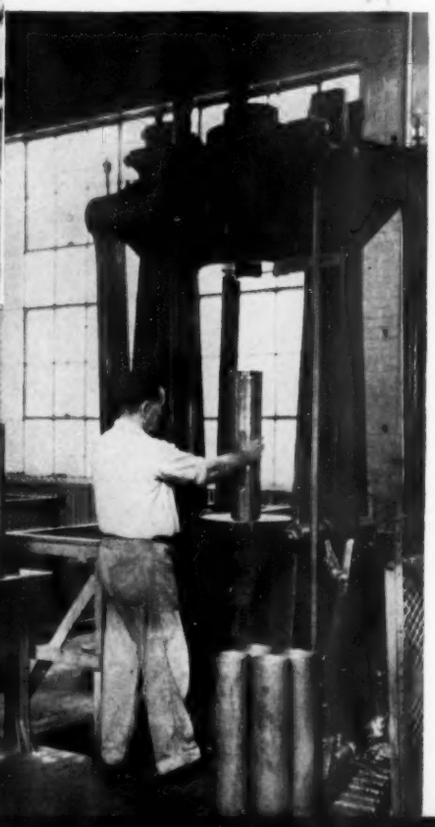
As in other Arsenal activities, cartridge case manufacture is still in a stage of development. New metals and methods are constantly undergoing test to determine their practical worth.

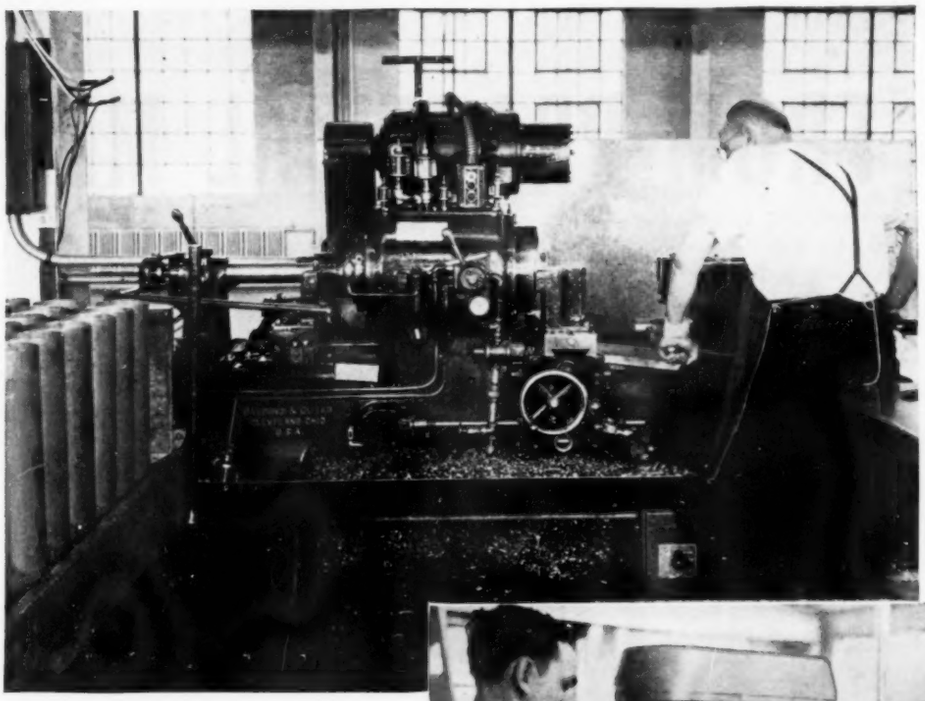
Efficacy in ammunition making may not be a happy subject to contemplate, but when shells are needed, they must be had quickly in quantity. Then there will be no time for experimentation. The know-how must be acquired now.



In drawing the case, excess metal is left in the closed end. This metal is useful when the case is headed in the 1000-ton HMP press illustrated. The machine has six stations and dial feed. During this operation a lip is formed on the outside for extracting the case after firing and a boss is formed on the inside to provide the primer seat

Before tapering, the mouth of this type of case is annealed to a depth of 7½ in. in a saltpeter bath. The object of this localized treatment is to soften the mouth of the case so it will not crack, while preserving the work-hardened qualities of the rest of its length. The case illustrated is tapered, mouth down, in a 75-ton Bliss press. The mouth is necked down to the approximate size of the shell that is to be fitted into it. Smaller cases are similarly tapered using a 25-ton Ferracute press equipped with dial feed





Cases are retrimmed on the open end, faced and turned on the extractor end, bored, counterbored and reamed for the primer hole in a Bardons and Oliver turret lathe. Special care is taken to get the extractor lip of exact thickness and diameter

Primer holes are threaded in a Haskins high-speed tapping machine. Following this operation, information as to the size, model, lot number, place of manufacture and commanding officer's initials are stamped on the base in a hydraulic press

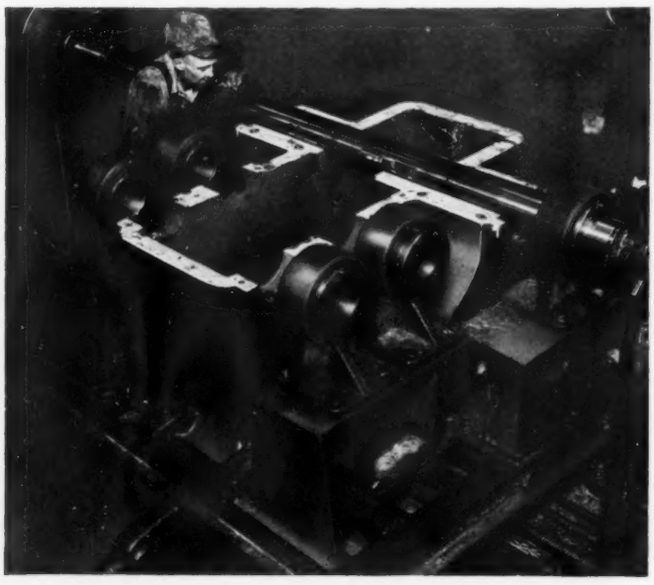
Following a final wash, the cases are given a low-temperature anneal by being passed through a conveyorized gas-fired Surface Combustion furnace. Then the cases are air cooled, inspected and packed for shipment

IDEAS FROM PRACTICAL MEN

A Fixture for Parallel Boring of Bearings

By HENRY C. FRANCIS

For securing accurate alignment of three parallel bearings the Lufkin Foundry & Machine Co., Lufkin, Texas, uses the illustrated fixture. The base is built up of I-beams welded to end beams of I-section and forming a very stiff foundation. On this base are supports for the bearings for aligning the boring bar. The bearings themselves are of hardened steel



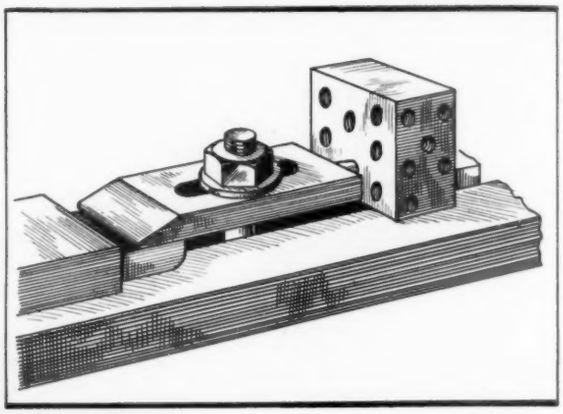
Hardened steel bearings mounted in cast brackets and bolted to an all-welded foundation secures good alignment of this boring bar for machining parallel bearings in this transmission housing

mounted in cast brackets that bolt to welded structural-steel supports. Three bearing plates are welded across the fixture to provide a good support for the casing which can be readily clamped in place. This not only secures good alignment but enables the work to be handled easily and rapidly.

Heel Supports for Clamps

By PETER L. BUDWITZ

Recently I noticed two steel blocks in a machinist's tool kit that were full of holes drilled at random in their four sides. They are used as blocking for the heels of strap clamps, as indicated in the sketch. The strap clamps used in connection with the blocks were of the type having pins in the ends of their heels, the



Steel blocks having holes drilled at random are used as supports for the heels of strap clamps of a type having pins in the ends of their heels

pins fitting loosely in the holes in the blocks. Since no two holes were the same distance from either the tops or the bottoms of the blocks, they served as supports for the heels of clamps in holding work of various heights from the machine table.

The blocks saved much time by eliminating the necessity for hunting around for blocking of the proper size, a condition with which many shopmen are familiar.

Hollowed Oilstones Should Be Trued

By ROBERT S. ALEXANDER

We do considerable scraping in our shop and find it necessary to have a number of oilstones always on hand and in first-rate condition. A scraper ground on a hollow concave oilstone is likely to prove an unsatisfactory metal-removing instrument. In order to restore a flat surface we tack a strip of coarse abrasive cloth to a smooth part of the workbench and rub the worn surface of the oilstone briskly on the abrasive until a flat, smooth surface is obtained. We find the abrasive cloth used on portable grinding and polishing wheels ideal for this purpose. While Mr. Hyler's (*AM*—Vol. 83, p. 919) method of rubbing the stones on a concrete walk is quite practical we find our own more efficient and convenient.

By L. F. SOUTHWICK

Mr. Hyler recommends sanding the surfaces of concaved stones or rubbing them flat on a concrete floor. This method will not work well if the stone is very hard and an accurately flat surface having a fine even grain like that of a new stone is desired. A hard stone

can be restored to its original state by rubbing it on a piece of plate glass about 16 x 16 in., using some loose alundum or aloxite. The grain sizes should be No. 40 for roughing to No. 180 for finishing.

By JAMES BARNDEN
Brighton, England

If an oilstone is ground on a surface grinder, using a silicon-carbide wheel (Norton 46-H or equivalent) it can be made so accurately flat that faces lapped on it will wring together. But if a really fast-cutting stone is required it is better to open up the grain on the surface by rubbing it on a flat, cast-iron plate sprinkled with No. 60 carborundum powder, which will produce a surface as good as that of a new stone.

When it is required to true a stone so that it will produce a surface equal to lapping, grind it as described above and then place a piece of paper 0.003 in. thick under one end and take another cut on it sufficiently deep to clean up half its surface as originally ground. The surface of the stone will then be 0.0015 in. convex which, paradoxical as it may seem, greatly facilitates flat lapping. Where a surface grinder is not available, a very good surface can be obtained by rubbing the stone on a grooved cast-iron lap sprinkled with No. 60 carborundum powder, testing the stone for flatness by rubbing it on a clean, flat cast-iron surface. The high spots will show black.

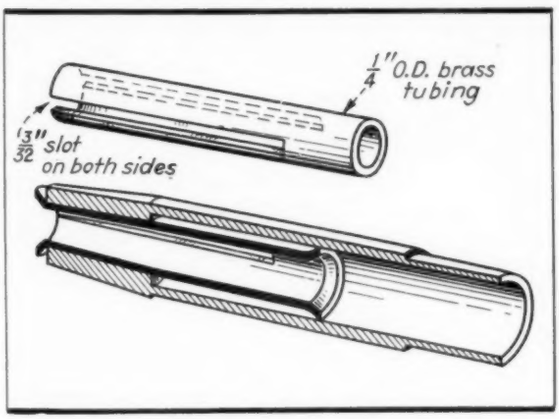
These methods have been found to be equally effective on both natural and artificial stones. One word of warning; when grinding natural stones of the Arkansas type, care should be taken to take light cuts so as to minimize any tendency for them to crack through overheating.

A Non-Scratch Feeder for Stainless Pins

By O. V. HOWE

Recently I was given the job of cutting off 5,000 pins from 0.162-in. polished stainless-steel wire. The polish on the pins was not to be scratched or marred in any way, but in spite of care, the first few pins cut off showed very pronounced scratches. I spent some time lapping out the feeding finger, but there was little, if any, improvement.

I cut off a piece of $\frac{1}{4}$-in. O.D. brass tubing about $1\frac{1}{2}$ in. long and cut a $\frac{3}{32}$-in. slot through both sides for about three-quarters of its length. A $\frac{1}{4}$-in. feeding finger was spread open and the brass tubing was inserted in it so that the slot in the tubing was in alignment with the slot in the feeding finger. The ends of the tubing were then flared with a center punch to keep it in place. With the brass-lined feeding finger in use, the 5,000 pins were cut off without being scratched.



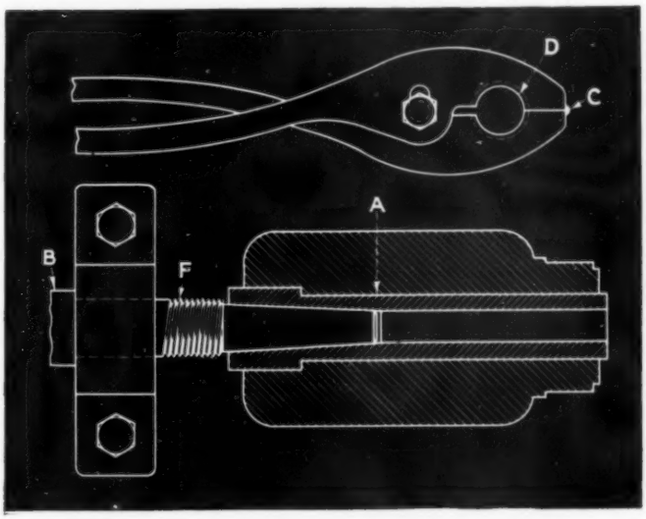
Pins cut-off from polished stainless-steel wire will not be scratched if this feeding finger lined with brass tubing is used

Improvised Puller for Motor Armatures

By JOSEPH I. KARASH
Tool Design Department
Reliance Electric & Engineering Company

A quantity of exciter armatures required dynamic balancing. Since the armatures were to be assembled to the armature shafts of motor-generator sets overhanging the bearings, it was thought advisable to hold them in that same position for balancing.

Referring to the illustration, the armatures were wound on quills *A* having taper holes and were held on the tapered end of mandrel *B* by wringing the two tapers together. After the first armature had been balanced it was found that the two tapers were locked together so tightly that the armature could not be removed by hand, so a very simple and efficient puller was improvised from a pair of pliers. With the pliers closed, a small spot of welding metal was deposited on the nose of the jaws at *C* and a hole was drilled and tapped through the jaws at *D*. The assembly was removed from the balancing machine and a thread



The locked tapers on motor armatures were forced apart by closing the tapped jaws of the pliers on the threaded part of the mandrel and revolving the armature

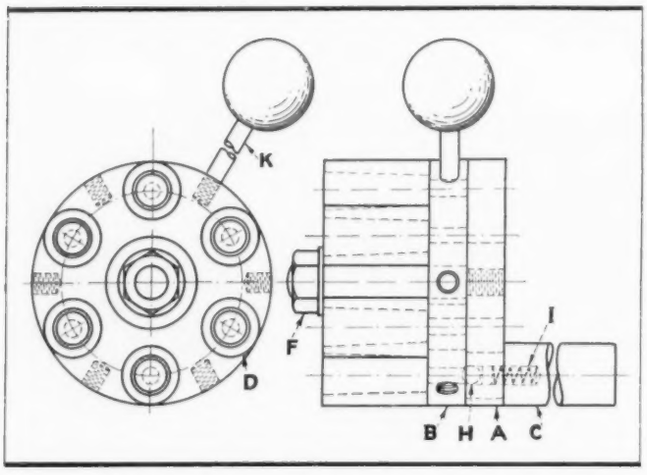
of the same diameter and pitch as that in the plier jaws was cut at *F* directly in front of the quill.

In operation, returning the assembly to the balancing machine, the pliers were held firmly on the threaded part of the mandrel and the armature and the mandrel were revolved together by hand, bringing the faces of the plier jaws against the end of the quill and forcing the locked tapers apart.

An Auxiliary Turret That Saves Time

By DOUGLAS TURNER

We have a large turret lathe in which it is often required to do small work. Rather than swing the heavy turret for each tool position, we made the small auxiliary turret illustrated which rotates in the vertical plane. Essentially, it consists of the round plate *A*; the round block *B*; the shank *C*; the bushings *D*; the stud *F* on which the round block is free to rotate; the steel ball *H*; the spring *I*; and the operating lever *K*. The shank is attached to the plate *A* and fits into one of the holes in the large turret. The



Indexing the auxiliary turret is much easier than indexing the large one and saves considerable of the operator's time and energy

bushings have taper holes to fit the taper shanks of the tools and have small holes in their inner ends in the mouths of which the steel ball engages, locking each in its respective position.

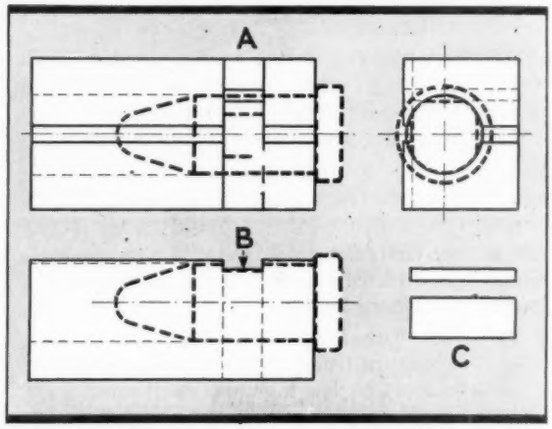
In operation, after one tool has completed its work, the turret slide is pushed back until all the tools clear the work. A quick pull on the operating lever starts the turret and disengages the ball from the mouth of the hole in the inner end of the bushing. Continued rotation of the turret brings the next bushing opposite the ball which is snapped into the mouth of the hole in the inner end of the bushing by the spring, bringing the next tool into alignment with the spindle. The tool is then fed to the work by advancing the turret slide. The operations are repeated until all the tools have done their work.

Study in Nozzle-Tip Fixture Design

By C. G. WILLIAMS

In milling tips for nozzles of fuel injectors for diesel engines, particular accuracy as to dimensions may not be required. Usually, the chief requisite is the holding of the rather delicate tip firmly in alignment during the milling operation. Lewis P. Sittig previously described (*AM*—Vol. 83, p. 148) a fixture for milling large quantities of these tips.

Mr. Sittig's proposed fixture was more or less intricate, but undoubtedly is adequately suited to milling



This simple arrangement of auxiliary jaws for the vise can be used for milling Diesel-fuel injection nozzles where the quantity of work does not warrant making an elaborate indexing fixture

these tips in large quantities. In the case where the number of nozzles to be milled is small, and heavy demands are not made on milling machine time, the writer believes that the illustrated fixture, which shows the work in place, would be adequate for the purpose.

It consists of a pair of auxiliary jaws for the machine vise. I would clamp a piece of flat steel between the jaws and drill and ream a hole through them endwise that would be a snug fit for the nozzles. I would then unclamp the auxiliary jaws and in one of them mill a slot *A* at the same distance from its end as the flats are from the shoulders of the nozzles.

Attaching the auxiliary jaws to the vise, I would mill a slot across their tops at *B* to a depth slightly more than that of the flats to be milled in the nozzles. Adjusting the cutter to cut the flats to the required depth, I would insert a nozzle to the shoulder, clamp it and mill the first flat. Then unclamp the nozzle and rotate it until the metal strip *C* could be placed endwise in the slot *A* between the flat just milled and the bottom of the slot; then clamp the nozzle, thus indexing it for the second flat. After milling the second flat, indexing the same way as before would bring the nozzle into position for milling the third and last flat. As an alternative, the first flats could be milled in all the nozzles before putting the steel strip into place for indexing for the second and third flats.

Chart for Bar Stock Calculations

BY M. A. MARKEL

THE ACCOMPANYING CHART, which takes into consideration the conventional sizes of bar stock and parting tools, is designed to determine quickly (1) the number of pieces which can be cut from a single bar; (2) the number of pieces which can be cut from a given amount of bar stock; and (3) the amount of bar stock required for a given number of pieces. The waste or crop end of the bar, as necessitated by the length of the piece or the machine, can also be determined. The table contains instructions for using the chart.

EXAMPLES

Case 1—Parting tool width = $\frac{3}{16}$ in.; piece length = $3\frac{1}{2}$ in.; bar length = 16 ft.; crop end = 8 in. By following instructions in the table, lines 1 and 3 are drawn vertically until they intersect the curves of the given piece length and bar length, respectively, that is, $3\frac{1}{2}$ in. and 16 ft. Lines 2 and 4 are drawn horizontally to intersect edges *A* and *E*, respectively, of the left-hand and right-hand vertical charts. The line from *A* to *E*, joining lines 2 and 4, intersects scales *B*, *C* and *D* giving the number of pieces from one 16-ft. bar as 49.

Case 2—Continuing the problem in case 1, line 6 can be drawn through 1500 pieces on scale *C*, for which it is found that 31 bars will be required.

Case 3—Continuing with case 1, assuming 15 bars are available, line 7 can be drawn, giving 735 as the number of pieces which can be obtained from the 15 bars; obviously, this can be obtained easily by simple multiplication.

The chart can be used in this manner where the piece length is shorter than the minimum crop end as determined by the machine chuck and stock feed. For pieces longer than the minimum crop end, line 5 has to intersect scale *B* at the largest whole number that will give a crop end equal in length or somewhat larger than the given minimum. This is illustrated by the following example, which corresponds to case 4 of the table.

Case 4—Parting tool width = $\frac{5}{16}$ in.; piece length = 10 in.; minimum crop end = 8 in.; bar length = 14 ft. Find the number of pieces per bar, the length of waste, and the number of bars required for 700 pieces. By drawing lines 8, 9 and 10 similarly to lines 3, 4 and 5 in case 1, it is found that 15 pieces is the maximum number of pieces that can be cut from the 14-ft. bar; therefore, line 11 is drawn from scale *A* through 15 on scale *B* until it intersects scale *E*. Line 12 is drawn horizontally until it intersects the curve for the 14-ft. bar. Line 13, dropped vertically to scale *F*, gives the waste end as slightly under 14 in.; 13.3 in. by calculation. By drawing a line through 15 on scale *B* and 700 on scale *C*, it is found that 46+ or 47 bars are needed.

(*Chart shown on page 145*)

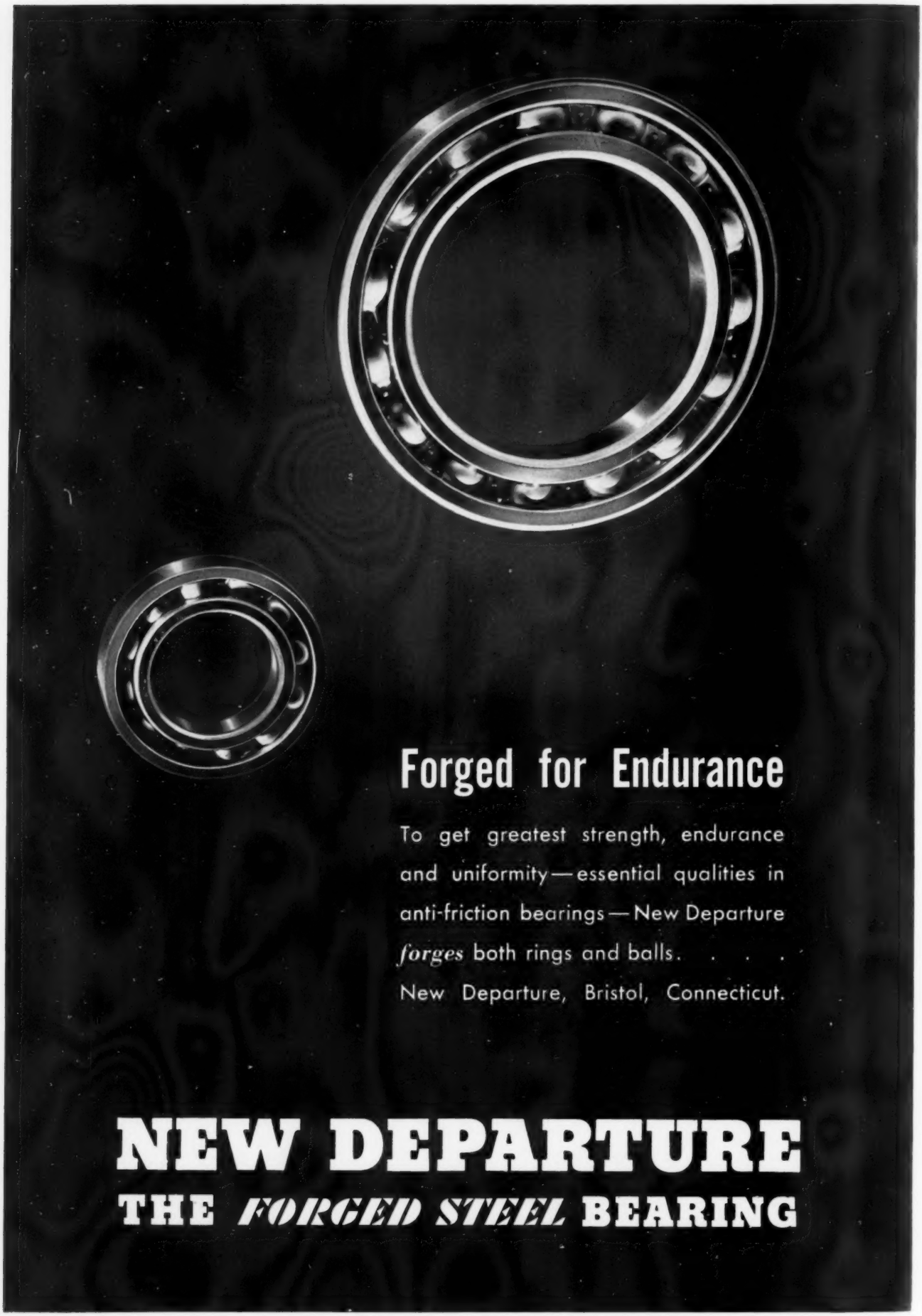
INSTRUCTIONS FOR USING THE CHART*

Case	*Given*	*Wanted*	*Draw connecting lines*	*Remarks*
1	Tool width Piece length Crop end Bar length	Number of pieces per bar	1, 2, 3, 4, 5	These instructions for pieces shorter than minimum crop end as necessitated by the machine
2	Tool width Piece length Crop end Bar length No. of pieces	Number of bars	1, 2, 3, 4, 5, 6	
3	Tool width Piece length Crop end Bar length No. of bars	Total number of pieces	1, 2, 3, 4, 5, 7	
4	Tool width Piece length Min. crop Piece length No. of pieces	(*a*) Waste (*b*) Total number of bars	8, 9, 10, 11, 12, 13** See Note *A*	These instructions for pieces longer than minimum crop end; line 11 has to intersect the largest whole number on scale *B* which gives a crop end equal to or greater than minimum crop.

*Examples in the text exemplify the use of these instructions.

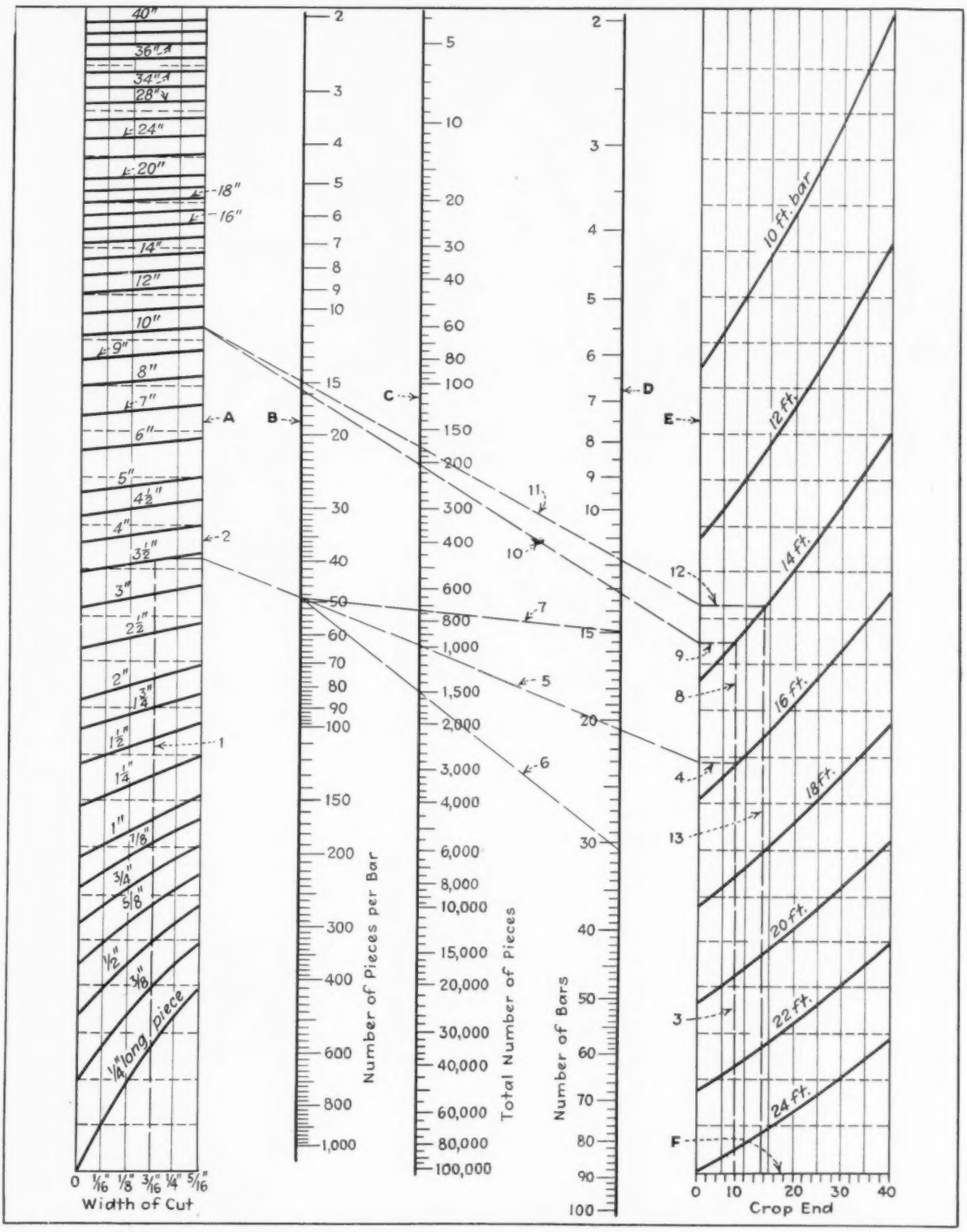
**Since a $\frac{5}{16}$-in. parting tool is used in this example, lines similar to 1 and 2 of case 1 need not be drawn.

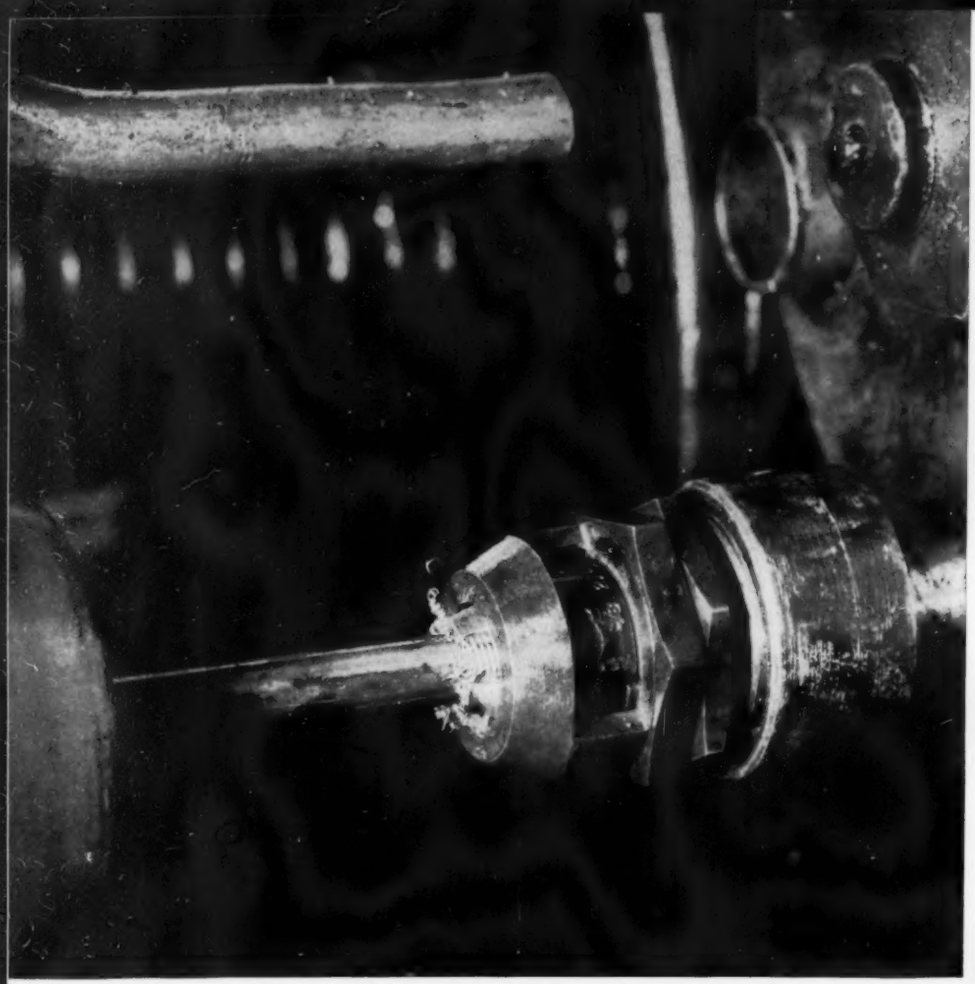
NOTE *A*· Lines drawn through scales *B* and *C*, intersecting scale *D*, will give the total number of bars required for a given number of pieces.


Forged for Endurance
To get greatest strength, endurance and uniformity—essential qualities in anti-friction bearings—New Departure *forges* both rings and balls. . . . .
New Departure, Bristol, Connecticut.
NEW DEPARTURE
THE *FORGED STEEL* BEARING

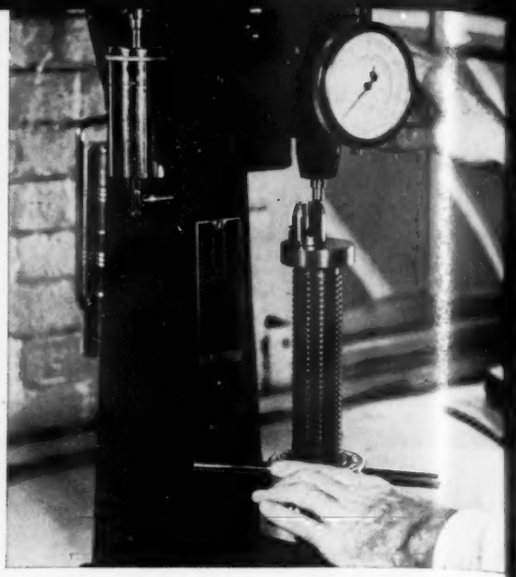
AMERICAN MACHINIST REFERENCE BOOK SHEET

Chart for Bar Stock Calculations





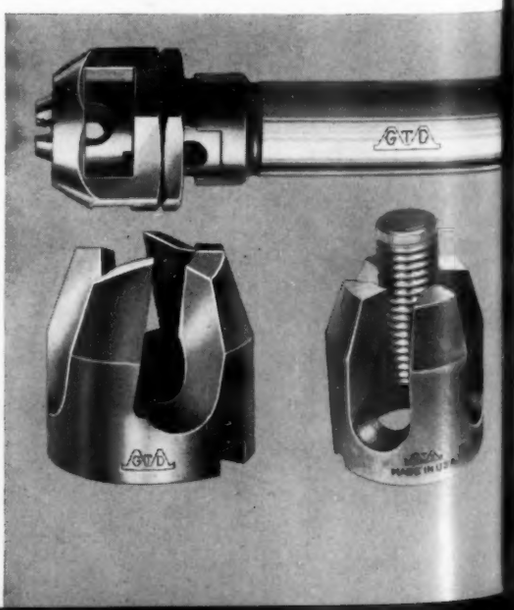
Each "Acorn" Die before final approval threads an actual test plug which is shipped to you with the die.



Too hard is as bad as too soft. Each heat-treated "Acorn" Die must pass this Rockwell Hardness Testing Machine.

Above: Limit snap thread gages check the pitch diameter of every "Acorn" Die test plug — 100% inspection.

Below: "Acorn" Die in regular holder.
Right: An "Acorn" Die with test plug inserted.
Left: An "Acorn" Hollow Mill.



AMAZING PERFORMANCE OF "ACORN" DIES NO "ACCIDENT"

How precision manufacture and repeated tests contribute to long accurate life

Super-accurate tools, such as "Acorn" Dies, call for unusual care in design and manufacture. Variation in cutting angle, in clearance, in chamfer — the least unevenness where the Die seats in the holder, destroys accuracy and cuts production to a fraction of what it should be. G. T. D. Greenfield supplements manufacturing care by thoroughly testing completed die. Some of the methods used to insure top performance are shown here.

It isn't the occasional record of an individual die that matters — it's the steady, consistent high production that "Acorn" Dies produce that makes them so favored by production men.

Greenfield Tap & Die Corporation · Greenfield, Mass.

Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles and San Francisco
In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.

GTD GREENFIELD

TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES · PIPE TOOLS

Back To The Gay Nineties?

IF YOU VISITED the New York World's Fair last summer, you may have strolled down the street of the Gay Nineties. You were amused by the gas lamps, the old-fashioned architecture, the seemingly grotesque dress of the people.

But how long would you be amused if you were suddenly transported, as if by a magic carpet, from 1940 to 1895 and had to live as people did then?

You wouldn't be able to whisk around the country by motor car or plane or streamline train. You couldn't set a thermostat in the fall and not worry about shoveling coal or building a wood fire through the winter's zero weather. You couldn't seek refuge in an air-conditioned room from the summer's sweltering heat.

You wouldn't have at your beck and call all the conveniences of living which today even people of low incomes have—the washing machine, the electric refrigerator, the radio, the vacuum cleaner, sanitary packaged foods, electric lights, inside toilet facilities, hot and cold running water, electric cooking stoves.

Mass production was unknown then. Many materials—alloy steels, aluminum, plastics—were yet to be developed. Machines didn't operate with the accuracy they do now. Products weren't made to such fine limits as ten thousandths of an inch.

How do you explain our ability to take such giant strides in improving our standards of living the past two generations? What has been the driving force which has helped create new industries employing millions of workers?

The answer is that in that period free rein was given to the inventive genius of the American system of free enterprise. No attempt was made to deprive inventors under our patent system of the benefits and profits of their discoveries.

It is appropriate that in the past few weeks honor should have been done the Modern Pioneers who, through invention and research, have contributed so much to the American way of life. We in the metal-working industry are especially proud of the fact that so many of these Modern Pioneers are part and parcel of our industry. That these men should receive national recognition on the one hundred and fiftieth anniversary of the American patent system is a particularly happy idea.

The services rendered by these 500 Modern Pioneers focuses attention on one point. Our patent system may not be fool-proof, but clearly it has worked in the interests of all the people. In the zeal for reform let's not tamper with it so that it may not function so well in the future.

Let's do nothing which may put a damper on invention or which may deprive inventors of the full rewards of their efforts. We surely do not want to do today what, if done in the Nineties, would have made life far less comfortable for all of us in 1940 and would have markedly retarded progress.

Burnham Finney

GAGING BUSINESS

Despite slight slackening of general business activity, metal-working industry continues to operate at near capacity. Domestic machine tool business exceptionally good

Contrary to the experience of general business, many branches of the metal-working industry have not shown any decline in operations and will go into the spring season running close to top speed. The full production enjoyed by the machine tool and airplane industries and the upward swing of farm implement and automobile makers more than offsets the downward sweep in steel output.

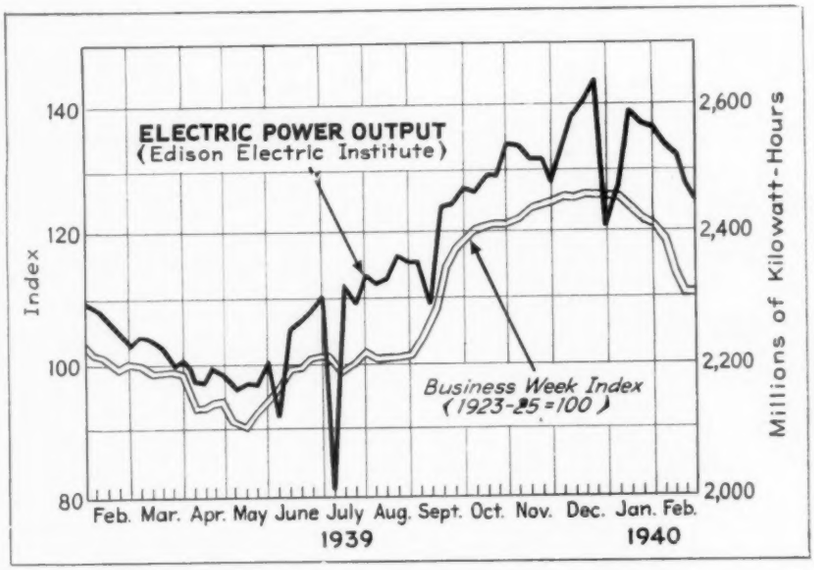
MACHINE TOOLS—Domestic orders for machine tools have been surprisingly large. Business is coming from a wide variety of industries, such as automobile makers, metal stamping shops, railroads, electrical manufacturers, structural steel companies, forge shops, agricultural implement and tractor works, tool and die shops, plumbing goods fabricators, hydraulic press builders and machine tool manufacturers themselves. Aircraft parts makers still are one of the chief bulwarks of the machine tool market. Motor car tooling programs for the 1941 model year are starting to break, the main worry on the part of the purchasers being the ability to secure new machines in time for the start of the new production season late in the summer. Some companies report that the volume of domestic orders to total bookings is higher than in months. Army and Navy contracts for machine tools are still being placed at a healthy rate, and no let-up is looked for in the near future. The industry is concentrating its energies first of all on supplying aircraft engine makers with their urgent requirements, substantial progress having been made in that direction the past two weeks. Foreign orders, especially from Britain and France, are continuing an important volume. Machine tool builders are not making any headway in cutting into backlogs. Deliveries range from three months up to the first quarter of 1941, with domestic customers being given preferential treatment.

AIRCRAFT—The British place with Douglas Aircraft an order for $20,000,000 for two-engined, high-speed, longe-range bombers similar to those being built for the French. These planes will be powered by Wright "2600" engines. Douglas now has unfilled orders totaling $100,000,000, including $14,000,000 of 42-passenger transport planes. The Allies have announced that they will buy all the aircraft that the U. S. industry can produce over and above the demands of the U. S. Army and Navy and of commercial aviation. Purchases may run as high as one billion dollars. Airplane manufacturers will not be asked to "freeze" their designs so that they can turn out planes on a mass-production basis. The Allies have given up the idea of standardizing Douglas, Curtiss-Wright and Martin planes, now wanting to take advantage of engineering improvements. Plane output on the scale proposed by the Allies would require big expansion of plan capacity which U. S. plane companies are reluctant to undertake. The War Department is opposed to freezing aircraft design in the U. S. at this time.

STEEL—After a sharp decline over a period of weeks, steel output is showing signs of stabilizing at up to 65 per cent of capacity. Inquiries are more active, and actual orders have gained a little. Production still is thought to be considerably in excess of consumption, although the operating rates of steel users are rising seasonally.

RAILROAD EQUIPMENT—Freight cars are being completed by equipments makers at the fastest rate in nine years. As a result the backlogs built up last fall are tapering off rapidly. New orders are anticipated soon, but not in enough volume to sustain operations at current levels. The New York Central has issued inquiries for 1,000 box cars for its subsidiary, the Pittsburgh & Lake Erie. The Burlington has placed orders for two diesel-powered streamlined trains. Electro-Motive Corporation will build the 4,000-hp. diesel locomotives; Budd will construct ten stainless steel cars and Pullman six others.

FARM EQUIPMENT—Despite generally unfavorable conditions in the wheat regions and low prices for stock, farm equipment manufacturers anticipate greater activity this year than last. International Harvester reports a considerable increase in business for the first quarter. Allis-Chalmers is building a sizable supply of small tractors in expectation of good spring sales. Ford has shipped to the Twin Cities what is said to be the largest number of small tractors ever sent by a single manufacturer to the northwest. The Nicaraguan National Bank has been authorized to order agricultural machinery which will total $350,000.



ALLIES TO SPEND BILLION FOR PLANES

Purchase requirements are announced as export obstacles are removed, standardized planes are no longer considered, and solution is seen to plant-expansion problems. Post-war production viewed with optimism

By BLAINE STUBBLEFIELD

WASHINGTON—If airplane manufacturers can produce and ship, in the next eighteen months, $1,000,000,000 worth of aircraft officially required here by the Allied purchasing commissions, the United States will emerge as the strongest potential air power in the world. This volume of airplanes is three times the total export of this country during the past 29 years.

Apparently the announcement of Allied requirements here resulted from steps taken by Treasury Secretary Morgenthau to coordinate production and allocate deliveries rationally to American commercial transport companies, to the Army and Navy, and to export. The Anglo-French statement points out, as Morgenthau did, that assignments for export are expected only after domestic needs are satisfied.

Mr. Morgenthau, at a recent press conference, stated that three major obstacles in the way of airplane supply to the Allies had been removed: (1) the government has been assured that France and England have the money and will pay cash; (2) the Treasury's tax policy will not hinder expansion of plants to fill the orders; (3) though complaints have been heard, manufacturers are not overcharging for export deliveries.

Billion Dollar Options

It is learned on good authority that the Allied Purchasing Commission has twice had verbal option with American manufacturers for a billion dollars worth of planes. Both times the option expired while the purchasers argued. The deal at one time called for only three types of planes, to expedite speed of delivery and service in action. But that scheme is off. The War Department refused to let U.S. industry concentrate on only three types, which would put this country on a three-type defense footing, and would support only a few of our manufacturers. Furthermore, the War and Navy departments do not like to freeze any single or few designs; this would retard technological progress, which is this country's main strength in the air. Then too, the government feels that it should not export late model planes unless it gets something in trade for engineering. What we are getting, in this case, is expansion of American plant, partly at Allied expense.

But there are other impediments in the way of a billion dollar foreign order than those officially recognized in the Morgenthau statement. One of them is the aircraft engine bottleneck. However, this has been tentatively solved by an agreement managed by the Treasury under which the machine tool builders will give priority on deliveries to engine builders.

Another uncertainty is plant capacity. The leading airplane makers with export orders have expanded their plants, some with Allied loans, some with their own or borrowed money. The Treasury has explained that corporation taxes will not hit idle plants after the war. But most men in command of airplane production remember the misery of after-boom days early in the thirties. In their hearts they are uneasy about this recurrence of astronomic figures, the helpless feeling of being carried on a flood, even though it's a flood of gold.

Resort to Sub-Letting

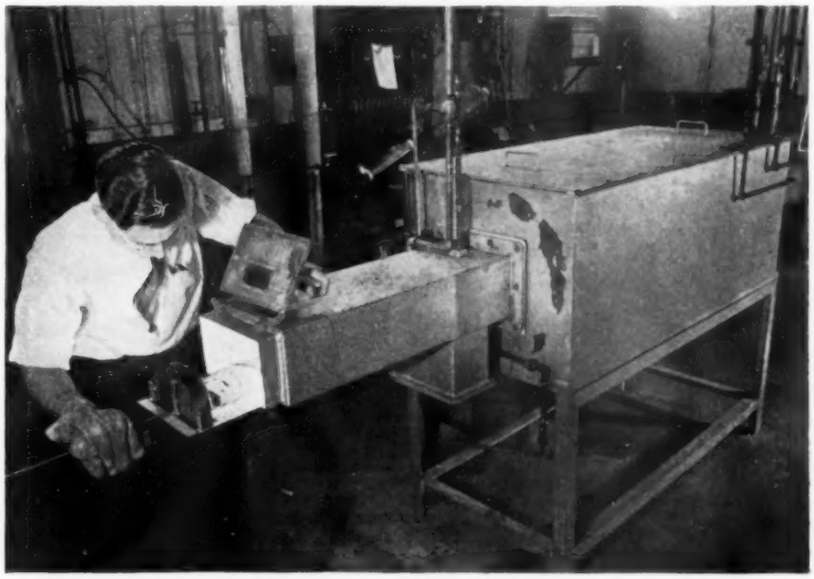
Manufacturers dislike spreading all over. Though they escape financial disaster, they will surely end with empty buildings. To avoid it, many have resorted to sub-letting welding jobs, parts assemblies, even undercarriages and wings. Some find subcontracting satisfactory, but there are many who do not.

In the last few days word spread that some aircraft manufacturers are seeking to merge, hoping to keep their pride of craft under their own roofs, meet the deluge of demand, and after the war, still have a following for normal production.

Experienced aviation observers in the services, in government and in civil life privately see trouble ahead for any persons who engage in this rush airplane business, all the way from bankers down to emergency-trained mechanics, if they don't keep their wits about them and plan for their futures. But Glenn Martin, who probably has more military plane experience than any other man in this country, is among the optimists. Mr. Martin says the industry will not be dislocated by peace, that a tremendous demand from governments all over the world will hold up the demand for American planes.

History May Repeat Itself

Another point of view, privately expressed by a federal authority on aircraft, is that history will repeat: that when peace comes, thousands of military training planes, instead of new designs, will be sold to private flyers. Bombers too, will go on the market converted into passenger equipment for operation on foreign airlines—especially if the world is slightly bankrupt, which it might be. The answer to such foreboding argument is that



Less Warpage—*By means of a delicately balanced hydrogen-nitrogen atmosphere and precise temperature control, this automatic electric furnace developed in the Westinghouse research laboratories permits hardening many steels without quenching, thus minimizing distortion. Finish on the part is unharmed*

design will outrun, and render unacceptable, converted equipment for all purposes; that this country can, while the rest of the world fights, develop new post-war civil and military designs for sale to other countries. We can sell many foreign airlines on American planes and with efficient supervision and service, keep it there. In fact the Allies imply that this is our opportunity to put the airplane industry on a mass production basis as we did the automobile industry. Airplane makers will answer that mass production cannot come so long as design changes with every new moon. Standardization is nowhere in sight. The basic form of planes, whether rotary or fixed wing, is not now certain.

Be the future what it will, the Allies, in the next few months, will buy all the aircraft and accessories this country can build, over and above our own needs.

Domestic requirement would of course increase instantly upon threatened involvement of the United States. Such threat might shut off export entirely. The feeling in Washington now is that we will stay out.

The first big order after the Allied announcement of intention was from the British Air Ministry for $20,000,000 worth of Douglas two-engined attack bombers, similar to current production for the French. Delivery to the British will begin late this year and will run through 1941.

HESITATE ON JAP EMBARGO

WASHINGTON — Congress is cooling on the idea of an embargo against war supplies for Japan. It doesn't like Japan any better, but it is very nervous about warlike steps. Best opinion is that if Cordell Hull actually asks for an embargo he will get it. Underofficials in the State Department are pressing Hull to ask Congress for specific action. Actually they don't care much whether the embargo is on shipping Japan war supplies or on importation of Japanese products, but admit much moral support could be mustered for an embargo on scrap iron and other war supplies. The State Department opinion is that there is no danger of war. The Japanese army hierarchy has demonstrated that it is vigorously opposed to expanding its operations to southeastern Siberia or the Dutch East Indies.

Canada Orders More Aircraft and Ships

MONTREAL—The Canadian government has placed an order with National Steel Car Corp. of Montreal for 242 Westland Lysander army co-operation planes valued at $6,875,000. Production is to start in May.

Orders for 404 Tiger Moths, 404 Fleet trainers and 100 Harvard advanced trainers, reported in the last issue of **American Machinist,** have been confirmed in the War Supply Board's weekly announcement, for the seven-day period ended February 17, showing some 500 aircraft and supplies, valued at $7,273,672, contracted for, during that week. The contracts announced included: Noorduyn Aviation, Ltd., $3,001,971; De Haviland Aircraft of Canada, Ltd., $2,057,845; Fleet Aircraft, Ltd., $1,038,675. These contracts did not include the orders for additional and spare parts, amounting to about 25 per cent extra.

The War Supply Board's announcement for the week ended February 17 also includes: $1,108,005 for parachutes, Irvin Air Chute, Ltd.; $9,574 for airplane parts, Ottawa Car & Aircraft, Ltd.; $34,209 for aircraft supplies from British Air Ministry. Among other contracts were: Naval stores—Anglo-Canadian Wire Rope Co., Ltd., $30,113. Mechanical transport—Metallic Roofing Co. of Canada, Ltd., $100,981; Firestone Tire & Rubber Goods Co., $62,350; International Harvester Co. of Canada, Ltd., $27,007; Ford Motor Co. of Canada, Ltd., $5,872; Chrysler Corp. of Canada, Ltd., $11,174. Machinery—T. E. Rider Machinery Co., $10,481. Electrical equipment—Northern Electric Co., Ltd., $159,937; Canadian Telephone & Supplies, Ltd., $160,615; Canadian Westinghouse Co., Ltd., $42,725. Munitions—British War Office, $307,000; U. S. Ordnance Engineers, Inc., $123,775; British Metal Corp., Ltd., $30,635; Consolidated Mining & Smelting Co. of Canada, Ltd., $30,635; Canadian Industries, Ltd., $10,368.

Conditioned Cleanliness—*Assembly, storage and test rooms of Landis Tool Company's high-speed spindle department receive only filtered air to eliminate all traces of dirt. Constant temperature is maintained to prevent even microscopic dimensional changes in the 50,000-r.p.m. spindles, and humidity is kept low to guard against rust. Liberal use of white paint helps keep things spotless, while diffusing windows, facing north, provide excellent illumination*

Large Military Truck Orders

General Motors Co. of Canada and Ford Motor Co. of Canada each has received an order for 1,600 military trucks. Production started last week.

Orders have been awarded to Canadian shipyards for construction of 28 minesweepers. The Canadian government has not yet announced which companies are receiving the contracts, though it is known 14 of the minesweepers will be built at British Columbia shipyards.

The Canadian government is expected to place shortly orders for new freighters. Davie Shipbuilding Co., subsidiary of Canada Steamship Lines, Ltd. of Montreal, expects to get contracts for at least two 10,000-ton freighters, to cost about $2,420,000 each.

Canada Steamships also plans to build several freighters for its own use to be operated on the Great Lakes.

INSIDE DETROIT

By Rupert Le Grand

DETROIT EDITOR

With current sales strong, plants boost production and increase work hours. Tool and stainless steel orders increase

DETROIT—Several automobile manufacturers boosted production schedules during the latter part of February as a direct result of strong current sales. Two General Motors units, which had been operating four days, resumed a five-day week. Hudson went to five days. Nash re-opened on a four-day basis, after a week's shutdown. Chrysler divisions operated five days, with schedules cut back only a few per cent from the peak last fall. Ford, at four days, is understood from reliable sources to be certain of going back to a full five days during the early part of March.

All signs point to 110,000 units per week during the early part of March, with the pace getting hotter as the month wanes.

February sales figures from General Motors divisions were good, but it can not be denied that other companies are not too eager to shout about the results. A feeling exists that aggressive sales campaigns in January did much to thin out the market for certain makes in the first ten days of the succeeding month. Long trades were offered in isolated cases for even some of the fastest-selling models.

Sales Up 30-50 Per Cent

Examination of sales reports by G.M. divisions for the first twenty days of February reveals record or near-record buying for this time of the year.

Chevrolet reported new car sales of 46,608, up 38 per cent over a year ago, but a bit short of the 47,413 sold in the first twenty days of January, which set a record.

Pontiac sold 8,901 vehicles, a gain of 50.7 per cent over last year. Sales topped the first twenty days of January, 1940. Unfilled orders gained. Used car sales declined for the first time in six months.

Oldsmobile had the largest twenty-day period for February in its history. Sales at 7,788 were 38 per cent greater than last year. A factor in the showing was the sale of 2,017 Custom 8 Cruisers, which showed the phenomenal rise of 180.9 per cent over last year.

Buick dropped back in the second ten days of February, having sold 5,184 units as compared with 5,749 during the first ten days. Nevertheless, this producer enjoyed a twenty-day period 31 per cent ahead of last year. Used car sales strengthened.

NO GOV'T. TOOLING CURTAILMENT

DETROIT—Reports are not true that the government is asking automobile companies to curtail retooling programs for 1941 to free machinery builders and tool shops for aircraft tooling work. It is a fact, on the other hand, that some automotive tool and die programs may be late because aircraft makers have hired so many men from independent tool and die shops.

To overcome the objections of women and some short-legged men to runningboardless cars, one large corporation is expected to equip its 1941 models with a floorpan some 8 in. wider than present. When a wider-base, Lincoln-Zephyr type door is opened, a short ledge will be revealed. This ledge, an extension of the floorpan, will give the entrant something to step on without getting a charley horse. Strange as it may seem, unions are opposing such design changes on the premise that workers in plants producing runningboards and supplementary parts will be affected adversely through diminished orders. It is understood that one of the biggest selling makes has been forced by certain customers to add running boards to models originally designed to avoid them, with a woeful effect upon appearance.

Tool-Steel Prospects

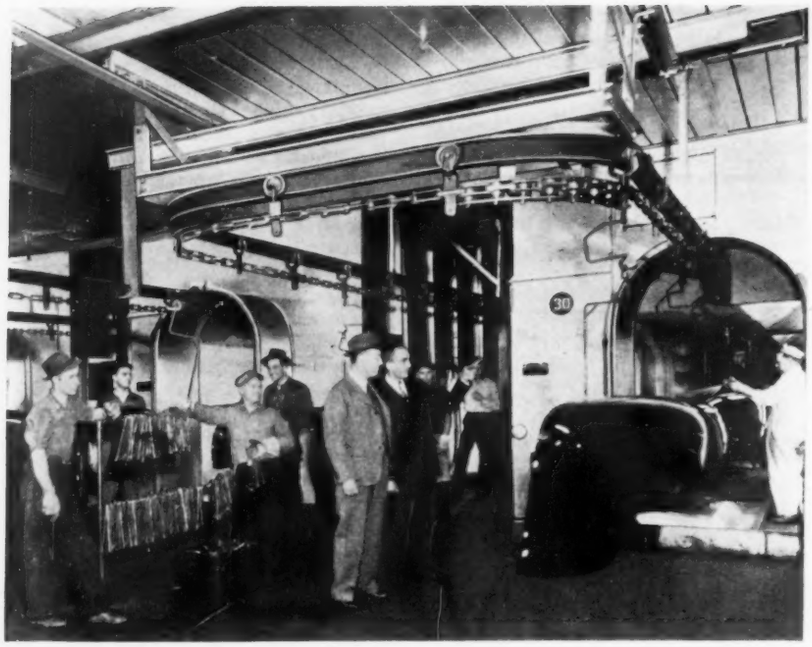
The large die programs under way lead observers in the tool-steel industry to predict an especially good season, starting within a few weeks. So many dies and tools will be required, outside of heavy body dies, that considerable tonnage of tool steel will be required for their fabrication.

Trim details for 1941 jobs are slow to make their appearance, but the feeling exists that more stainless steel will be taken by the automotive industry for next year's cars than at present. It is remarked that consumption of stainless steel for automotive purposes—hub caps, belt lines, windshield wiper arms and other parts—is now twice what it was a year ago.

Buick Starts New Construction

Buick division of General Motors will shortly launch the construction of two new buildings with accompanying docks, and receiving and shipping facilities, as the initial step in a new program of plant renewal

Less Error—*This piston-ring testing machine developed by Pontiac has so reduced errors that changes in ring specifications may result. A lamp lights when ring is compressed to its exact diameter, the scale then showing ring tension to within a quarter of a pound. All frictional errors are eliminated*



Better Booths—*Latest-type spray booths in Plymouth's new paint-finishing set-up help achieve best results with soy-bean enamel. Over the heads of works manager E. S. Chapman, center, and plant engineer C. C. Williams is a false ceiling which distributes 300,000 cubic feet of doubly purified air per minute. Paint booths, right, illuminated by fluorescent lights, receive three changes of air each minute, while suction fans exhaust fumes through a water curtain*

Labor to Receive $900,000,000 From U. S. Shipbuilding Program

NEW YORK—The cost of labor involved in the construction program of naval and commercial ships amounts to $900,000,000, according to an estimate of the National Council of American Shipbuilders. The survey includes an analysis of the origin and cost of materials and equipment to be used in 141 merchant ships building or contracted for by the Maritime Commission's replacement program. The total figure for labor includes indirect expenditures in manufacture, preparation of materials, transportation, and naval labor.

JOINT ORDERS SET PRECEDENT

CHICAGO—Representatives of Western railroads are considering joint purchase of 500 covered hopper cars for handling bulk cement and other dry-load bulk products. This to get a better price than if they were bought in individual lots for each road. This may set a precedent in railroad buying.

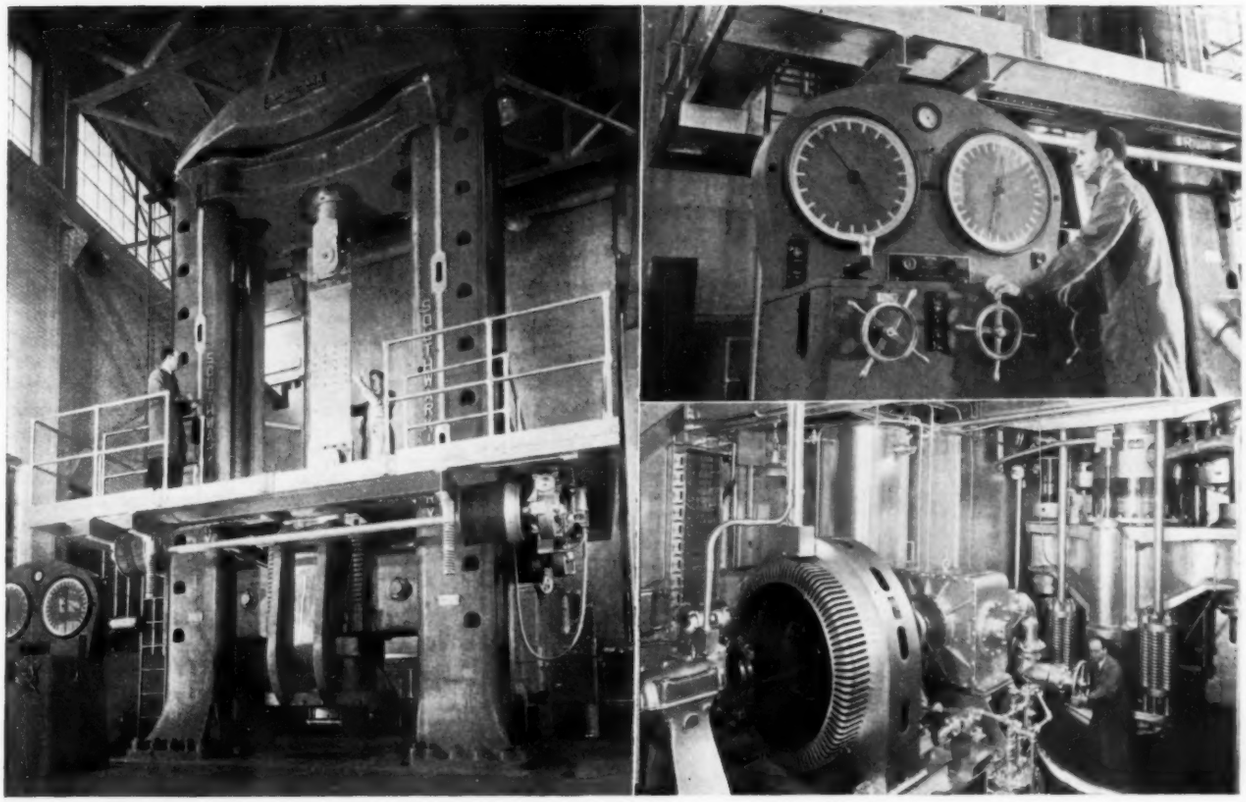
and expansion. Immediate construction will include a new plant to house manufacture of axles, with the rearrangement of plant and equipment for the production of axle gears, and a large addition to the sheet-metal plant providing for expanded facilities in this department. Awards for the structural steel of both buildings were made last week, involving more than 1,400 tons. The Flint Structural Steel Company and the Mahon Company of Detroit were the successful bidders.

From a design standpoint, the new axle building is exceptional in its provision of ideal working conditions. Unusual window area, providing light and ventilation from every exposure, will make it appear to be virtually a "glass building." By far the major portion of the exterior wall surfaces are devoted to windows. Its plans, developed by Albert Kahn, Inc., industrial architects, call for over 40,000 square feet of glass, with windows covering the main walls and the monitor section of the long roof.

According to the Buick management, the new building development involves extensive rearrangement of machinery and equipment and a number of detailed construction and plant engineering projects incident to its completion and operation. All of the construction and rearrangement of plant and equipment will be carried on without interrupting Buick production, and, according to the management, this entire phase of the 1940 building program is expected to be completed by midyear.

U. S. Government Contracts Awarded to Metal-Working Firms

Contractor	Gov't. Agency	Commodity	Amount
Puget Sound Machinery Depot, Seattle, Wash.	Navy	Boilers	$43,559
American Steel & Wire Co., New Haven, Conn.	War	Wire rope	30,801
Bethlehem Steel Co, Bethlehem, Pa.	Ordnance	Shell forgings	121,728
Norris Stamping & Mfg. Co., Los Angeles, Calif.	Ordnance	Cartridge cases	502,000
Northern Pump Co., Minneapolis, Minn.	Navy	Hydraulic parts	400,000
Leece-Neville Co., Cleveland, Ohio	Navy	Diesel parts	76,565
Sullivan Machinery Co., Michigan City, Ind.	Ordnance	Air compressor	33,291
Electric Storage Battery Co., Philadelphia, Pa.	Navy	Storage batteries	38,306
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.	QMC	Water heaters	91,364
Homelite Corp., Port Chester, N. Y.	Signal Corps	Power unit	137,504
Lycoming Div., Aviation Mfg. Corp., Williamsport, Pa.	Air Corps	Propeller blades	46,800
Douglas Aircraft Co., Santa Monica, Calif.	Navy	Airplane parts	32,725
Kollsman Instrument Co., Elmhurst, N. Y.	Navy	Tachometer generators	38,972
Spencer Lens Co., Buffalo, N. Y.	Navy	Telescopic alidades	58,220
Air Associates, Inc., Garden City, N. Y.	Air Corps	Mooring kits	88,806
Camden Forge Co., Camden, N. J.	Navy	Training circle racks	137,500
York Safe & Lock Co., York, Pa.	Navy	Gun mounts	59,846
Harry C. Weiskittel Co., Baltimore, Md.	QMC	Ranges	44,950
Chase Brass & Copper Co., Waterbury, Conn.	War, Navy	Soap boxes, tubing	48,168
Morse Chain Co., Detroit, Mich.	Navy	Diesel parts	36,121
Ex-Cell-O-Corp., Detroit, Mich.	Navy	Diesel parts	152,426
Chandler-Evans Corp., South Meriden, Conn.	Navy	Fuel pumps	35,754
Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.	Air Corps	Wheel assemblies	110,200
General Electric Co., Schenectady, N. Y.	Navy	Instruments	83,285
Bausch & Lomb Optical Co., Rochester, N. Y.	Ordnance, Navy	Optical instruments	256,887
Threadwell Tap & Die Co., Greenfield, Mass.	Navy	Taps and dies	11,141
Nicholson File Co., Providence, R. I.	Air Corps	Files	11,196
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, Ohio	Navy	Milling machines	19,483
H. B. Underwood Corp., Philadelphia, Pa.	Navy	Milling machines	14,624
Reed-Prentice Corp., Worcester, Mass.	Navy	Engine lathes	40,041
National Acme Co., Cleveland, Ohio	Ordnance	Screw machines	37,920
Brown & Sharpe Mfg. Co., Providence, R. I.	Ordnance	Milling machines	13,878
Morton Mfg. Co., Muskegon Heights, Mich.	Ordnance	Milling machines	126,490
Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.	Ordnance	Star gages	18,890
Gisholt Machine Co., Madison, Wis.	Navy	Turret lathes	21,095
Warner & Swasey Co., Cleveland, Ohio	Navy	Turret lathes	26,585
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.	Navy	Boring machine	24,293
Cleveland Twist Drill Co., Cleveland, Ohio.	Navy	Twist drills	13,213
Sebastian Lathe Co., Cincinnati, Ohio	QMC	Lathes	16,260
Producto Machine Co., Bridgeport, Conn.	Ordnance	Routing machines	18,000



Quest for Knowledge—*Installed in the New Kensington, Pa., laboratories of the Aluminum Co. of America, this giant hydraulic testing machine, left, was inspected March 2 by high-ranking military and industrial officials, who watched it being put through its paces. Built by Baldwin-Southwark Corp., it can exert forces of 3,000,000 lb. in compression and 1,000,000 lb. in tension. Upper right, controls and recording instruments; below, the 300-hp. motor*

Exports of Machinery During December, 1939

	December 1939	November 1939	December 1938
Electrical machinery	$10,866,114	$9,761,135	$9,876,700
Power generating machinery (except automotive and electric)	1,612,727	1,245,141	1,278,872
Construction and conveying machinery	2,399,993	1,464,916	2,218,115
Mining, well and pumping machinery	4,928,431	3,793,296	4,991,166
Power driven, metal-working machinery	12,821,234	8,604,263	9,873,371
Other metal-working machinery	477,249	446,237	330,815
Textile machinery	1,021,409	825,572	663,598

Exports of Metal-Working Machinery During December, 1939

Engine lathes	$778,015	$614,858	$383,696
Turret lathes	881,500	487,714	348,816
Other lathes	244,875	319,878	171,999
Vertical boring mills and chucking machines	770,439	477,673	335,598
Thread cutting and automatic screw machines	801,006	434,957	473,073
Knee and column type milling machines	717,412	518,304	269,346
Other milling machines	1,025,706	843,427	1,411,354
Gear cutting machines	466,327	468,851	269,832
Vertical drilling machines	196,777	239,293	95,717
Radial drilling machines	159,802	68,922	51,389
Other drilling machines	194,583	95,661	151,431
Planers and shapers	581,974	203,111	541,825
Surface grinding machines	162,935	174,414	436,454
External cylindrical grinding machines	424,175	502,592	287,885
Internal grinding machines	340,795	460,276	267,357
Tool grinding, cutter grinding, and universal grinding machines	546,692	489,133	320,432
Other metal-grinding machines and parts	448,142	361,810	396,650
Sheet and plate metal-working machines and parts	406,952	348,624	775,534
Forging machinery and parts	671,868	351,887	556,923
Rolling mill machinery and parts	1,113,354	161,368	1,472,350
Foundry and molding equipment and parts	102,420	130,204	47,256
Other power-driven metal-working machinery and parts	1,779,498	724,076	808,454

Other Metal-Working Machinery

Pneumatic portable tools	$126,248	$107,594	$100,807
Other portable and hand or foot-operated metal-working machines and parts	129,309	84,714	101,582
Chucks for machine tools	44,659	30,127	32,466
Milling cutters, machine-operated threading dies, and taps and similar machine-operated metal cutting tools	89,206	114,895	59,697
Other metal-working machine tools and parts	87,827	108,907	36,263

Export of Strategic War Materials Not Heavy

WASHINGTON—Review of the import and export figures for the last four months of 1939 show that this country lost little tin, rubber or other strategic materials. What at first was heralded as the outflow of such materials at a dangerous rate proves to have been reexports only. Canada, stocking up on war materials, bought supplies abroad that were landed at American ports and transshipped to Canada.

Important export increases in the last four months of 1939 were confined to machine tools, airplanes, petroleum products, cotton, trucks and certain chemicals.

CRUISER CONTRACTS ABOUT TO BE LET

WASHINGTON—Bids submitted by Bethlehem Steel Company and New York Shipbuilding Corporation on two 10,000-ton light cruisers, recently opened by the Navy, probably will be followed by awards to one or both companies. Contracts of course are contingent on other considerations than lowest bid. But these firms are regarded as able to meet all requirements.

WATCHING WASHINGTON

McGraw-Hill Washington Bureau

PAUL WOOTON, CHIEF

Although the new National Mediation Board is offered as one means to obtain labor peace, no changes in the Labor Act are imminent. Educational orders remain small

WASHINGTON—Old Doctor Roosevelt's labor relations medicine seems to have helped some people, but for the country at large the cure is as bad as the ailment, or worse. Congressmen from industrial regions are feeling as light-headed as employers themselves, and many Washington folks think the Doctor himself feels badly and probably will try to mix up a new remedy.

This session of Congress is making three inquiries into the Wagner Act and its administration. Considering the hearings as one phase of the complicated NLRB mess, notice one move that may be important in the outcome. This is the bill recently introduced by Sen. Robert F. Wagner, (N.Y.) author of NLRA proposing a National Mediation Board. It would be modeled on the Labor Department's Conciliation Service, except that it would be a three-man authority, whereas the present Service is headed by a director. Friends of the Conciliation Service are furious with "politicians who want to use the fine reputation of this small agency to patch up the NLRB mess."

What stirred this town most, recently, was NLRB Chairman J. Warren Madden's admission before the Smith Committee that the Board had made a deal with RFC under which contracts for government supplies are withheld from manufacturers accused or convicted of violating the Act. The Wage-Hour Division and other federal agencies have followed suit. Enemies say this is vicious; it condemns persons not convicted of law violation. Friends say it's all right; awards to low-bidder-violators place a premium on illegal wage cutting. Meanwhile, counsel for the Procurement Division of the Treasury, which buys the bulk of government supplies, have advised that the NLRB-RFC blacklist is illegal and Procurement will have none of it.

Most labor men in the Capital think there will be no amendment of the Labor Relations law this session. The left wing threat at the polls this fall is too strong for the potential reformers.

Take yourself around town visiting experienced onlookers here, and you confirm the impression that the Board and not the law is mostly to blame for the trouble. They guess that, if Congress does anything, it might repeal the clause setting up the three-man Board. Then a clause would be substituted, creating a five-man Board.

$200-Wage Amendment Still Pending

The Kramer amendment to the wage-hour act exempting everyone earning $200 a month will not be acted upon soon. Congressional advocates of changes have agreed to let Administrator Fleming see what he can do administratively. He will hold hearings soon aimed at redefinition of administrative and executive employees (probably no redefinition of professionals) and may go so far as to call everyone earning more than a certain amount an executive. Fleming, incidentally, is now administrator *de jure* as well as *de facto*, Congress having approved appointment of an Army officer to the post. His first official act thereafter was to point out that the successful suit of five track-walkers against the Atlantic Coast Line Railroad should be a warning to other violators of the act.

IDLE-PLANT TAXES EXPLAINED

WASHINGTON—The question of taxes on expanded aircraft and other munitions plants which will become idle after the war is puzzling many people. This is the way the Treasury experts explain it: An idle plant, regardless of whether the Allies paid for it, is allowed five per cent deduction for depreciation, the same as for that part of the plant which is operating. The deduction from the silent plant is taken off the net from the earning plant. Thus the owner is better off than if he didn't own the idle property—so far as federal income taxes are concerned. As for property taxes, the owner can fight that out with local authorities. Treasury doesn't remind you, but many a plant has been built just to get depreciation benefits.

Educational Orders Will Remain Small

Another list of educational orders awards is due about now. The balance of the $14,250,000 appropriated for fiscal 1940 must be spent by July 1. Manufacturers have observed that the orders generally are in small amounts, few in excess of $100,000. The War Department is spreading its money thin so as to give experience to more firms. The biggest order, for automatic rifles, was about one million dollars. This product is difficult, requiring perhaps 2000 operations, and most of the money went for tooling and engineering. Orders are just big enough to give the manufacturer a workout like he would get with a real war order, including procurement of materials, design, production routine and routing. Some days ago, a number of Congressmen talked of increasing the present authorization of funds for educational orders, but now they seem to have dropped the project.

Patent Legislation Not Dead

Congress is arranging for a celebration of the sesquicentennial of the first patent law, but when the anniversary comes, on April 10, it won't be accompanied by new legislation limiting the rights of patentholders. The bills which looked so active last year are now bottled up in committee, at least until the TNEC presents its report on patents. And meanwhile opponents of changes have had a chance to marshall their forces and their facts. An entirely different line of attack on patent abuses is, however, being developed in Thurman Arnold's anti-trust division. With the battle-cry that a legal privilege may not be used for an illegal purpose, Arnold is pushing a suit against practically the entire glass industry charging use of patents to restrain trade. Similar suits are understood to be in the works against the optical, radio, and electrical appliance industries.

Group Organized to Promote Labor Peace

The promotion of peaceful relations between employers and employees by introducing scientific practices into collective bargaining is the objective of a new nonprofit membership society called "Collective Bargaining Associates." The organization, formed late last month, includes Solicitor General Francis Biddle; John M. Carmody, Administrator of the Federal Works Agency; William M. Leiserson, member of the National Labor Relations Board; Otto S. Beyer, chairman of the Railway Mediation Board. The work of the society may not be specially impressive since it is made up of men favorable to the Roosevelt administration.

REPUBLIC EXPANDS STAINLESS STEEL FACILITIES

Major Portion of Equipment Concentrated at Canton and Massillon

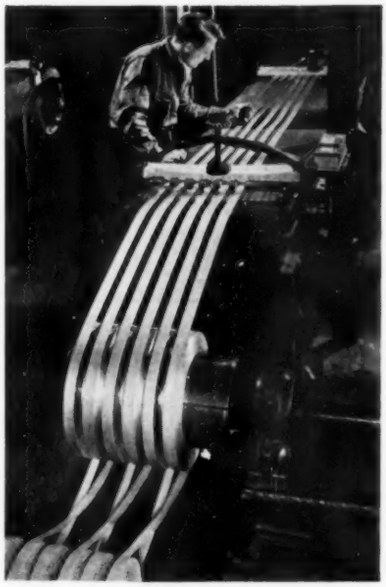
CLEVELAND—Keeping pace with the rapidly increasing demand for stainless steel, the Republic Steel Corp. on Feb. 28 formally put into operation improved and greatly expanded stainless steel facilities at Canton and Massillon, Ohio. The stainless department now occupies all wings of a five-acre building, part of which had to be rebuilt to accommodate new equipment. Included are three annealing and pickling lines which were moved from the Warren, Ohio, plant, a new two-high skin-pass mill, and three new four-high reversing mills, the largest of which is a 34-in. unit.

The Massillon plant was previewed on Tuesday, Feb. 27, by a large group of newspaper and business paper editors, who also inspected a 25-ton electric furnace transferred from Buffalo and a completely new 50-ton unit which was recently added to the battery of six furnaces at Canton, where the stainless steel is produced.

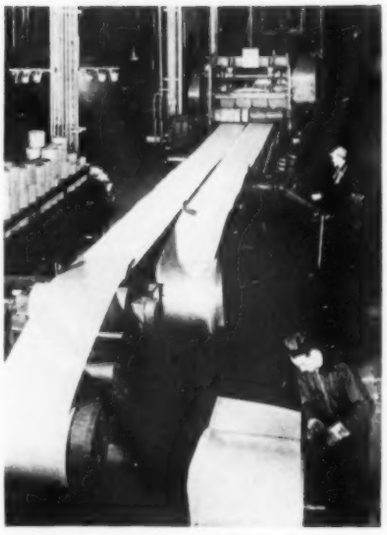
With the exception of hot rolling of coils, which is done at nearby Warren, Republic has now concentrated all its stainless steel operations at Canton and Massillon. The improved and expanded facilities give the company a capacity in the stainless strip department alone of 1,200 tons per month, and enable it to produce coils of cold-rolled stainless strip as narrow as ¼ in. and as wide as 23 1/8 in. The new mills are currently producing gages as thin as 0.010 in., but it is expected that they can roll 0.006 or 0.008 in. strip for stressed-skin airplane structures, which should develop into a huge market. The Massillon plant is equipped to polish sheets 68 in. wide and 24 ft. long, all commercial finishes being produced on abrasive-band and oscillating-wheel polishers.

All Republic's stainless is produced at the East End plant in Canton. Unpolished sheets and light plates are finished at Canton, and polished sheets and plates and cold-rolled strip are finished at Massillon.

Improved facilities at Massillon *now occupy all wings of a five-acre building, give Republic a capacity in the stainless strip department alone of 1,200 tons per month. Above, coils are trimmed and slit for automobile moldings, architectural decorations, and other applications*



Narrow coils *of stainless strip are gaged on an inspection table while paper strips are inter-rolled with them to protect the finish. Strips from ¼ to 23 15/16 in. wide can be produced with the new equipment*



Wide coils *of stainless steel come off one of the five normalizing and pickling lines of Republic's expanded cold-rolling and finishing plant at Massillon, Ohio. Facilities were formally put into operation Feb. 28*

SALES

FRANK L. CAMPBELL, sales manager Fayette R. Plumb, Inc., Philadelphia, Pa., has been elected secretary. FRANK P. GREEN has been appointed merchandise director and elected a director. LOUIS E. GILLIARD has been appointed traveling sales manager.

R. A. CANNON, vice-president in charge of casting sales for the Birdsboro Steel Foundry & Machine Co., Reading, Pa., has been appointed vice-president in charge of sales.

H. W. COLLINSON, for many years Cleveland district sales manager of the Carborundum Co., Niagara Falls, N. Y., has been transferred to Chicago as district sales manager. Mr. Collinson takes over the post formerly held by F. E. GRIDLEY, who has been granted an extended leave of absence. E. F. KONKER will succeed Mr. Collinson at Cleveland.

EDWARD D. EMERSON, since 1937 district sales manager Babcock & Wilcox Tube Co., has been appointed general manager of sales for John A. Roebling's Sons Co., Trenton, N. J.

FRED E. HAKER, who joined Allis-Chalmers Mfg. Co., Milwaukee, Wis., in 1900 as a stenographer, has been appointed general manager of purchases.

H. L. JOSEPH HUMPHREY has been appointed advertising manager of the Ex-Cell-O Corp., Detroit, Mich., succeeding TOM MOULE.

M. W. LIGHTCAP, formerly with the Pittsburgh Plate Glass Co., has been appointed manager of maintenance sales for the Devoe & Reynolds Co., New York, N. Y.

C. H. MCCOLLAM, metallurgist of the Steel & Tube Division of Timken Roller Bearing Co., Canton, Ohio, has been appointed assistant director of steel sales.

REESE MILLS, manager of the range and water heater department of Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., has been appointed assistant sales manager of the Merchandising Division. He succeeds RAYMOND C. COSGROVE, resigned. His place will be assumed by R. M. BEATTY, sales development manager of the range and water heating department.

L. S. MULLEN has been appointed assistant sales manager for the Pittsburgh Steel Co., Pittsburgh, Pa. Associated with Pittsburgh Steel since 1938, Mr. Mullen was formerly connected with the Republic Steel Corp. for ten years in various sales capacities.

E. F. MURPHY, since 1919 associated with Graybar Electric Co. and recently assistant sales manager of the New York City district office, has been appointed Eastern commercial sales manager.

H. R. NORGREN has been made assistant general sales manager in charge of special accounts; D. E. WILLIARD, assistant general sales manager in charge of regions and branch offices: and L. A. O'REILLY, manager of the dry cleaning division, Detroit Rex Products Co., Detroit, Mich.

GEORGE W. PLAISTED, for the past seven years vice-president in charge of West Coast operations for the Austin Co., Cleveland, Ohio, has been named vice-president and general sales manager with headquarters at Cleveland.

THOMAS M. PURTELL has been appointed district manager of sales for the Connecticut territory of the Wyckoff Drawn Steel Co., Pittsburgh, Pa.

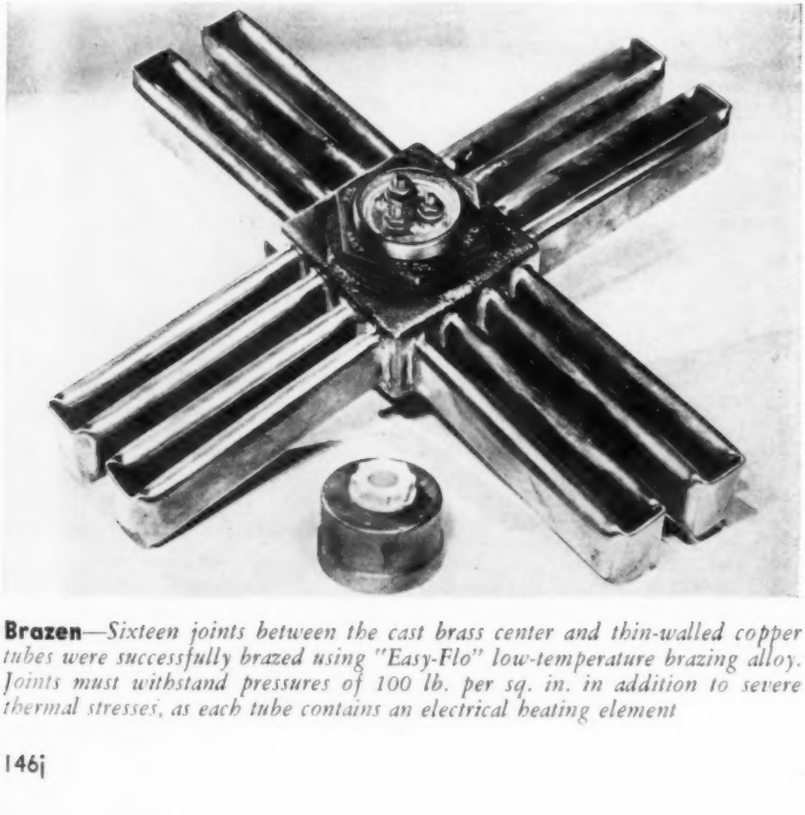
P. J. REEVES, former manager of the Los Angeles office of the Timken Roller Bearing Co., Canton, Ohio, has been transferred to the company's home office to engage in special sales work. His Los Angeles position will be filled by S. T. SALVAGE, promoted from the company's sales engineering ranks.

HAROLD R. SMALLMAN, formerly in charge of the Chicago district office of Hanson-Van Winkle-Munning Co., Matawan, N. J., has been made Western manager.

JAMES TATE, sales director Delta Mfg. Co., Milwaukee, Wis., has been elected a vice-president. ROBERT P. MELIUS has been appointed general sales manager, while ROBERT C. BECK has been named assistant sales manager. FREDERICK W. VORCK has been appointed sales manager of the Eastern Division and JACK MATHER sales manager of the Western Division.

HERBERT J. WATT has been appointed manager of sales for the central area of Carnegie-Illinois Steel Corp. with headquarters in Pittsburgh, Pa.

H. H. YEAGER, for a number of years district sales manager of the Dodge Mfg. Corp., has been appointed assistant sales manager of the Shafer Bearing Corp., Chicago, Ill.



Brazen—*Sixteen joints between the cast brass center and thin-walled copper tubes were successfully brazed using "Easy-Flo" low-temperature brazing alloy. Joints must withstand pressures of 100 lb. per sq. in. in addition to severe thermal stresses, as each tube contains an electrical heating element*

NAMES in the NEWS

G. F. BERG, chief mechanical engineer of the Netherlands East Indies State Railways, is now visiting locomotive builders and machine tool manufacturers in the United States.

E. L. MCILHENNY has been appointed manager of the Alkali Division, Detroit Rex Products Co., Detroit, Mich.

JAMES R. SHELDON, since 1932 president Waterbury Clock Co., Waterbury, Conn., has resigned to become president of the Meldon Export Corp., New York, N. Y.

HAROLD S. FALK, since 1920 vice-president and works manager of The Falk Corp., Milwaukee, Wis., has been elected president. He succeeds HERMAN W. FALK, founder of the company and president since its inception, who will continue to serve as chairman of the board.

Harold S. Falk first became associated with the organization in 1900, working with the company for the next six years during summer vacations. Upon graduating from the University of Wisconsin in 1906, he entered the permanent employ of the company as assistant to the superintendent. From 1906 to 1920 he was

HAROLD S. FALK

employed in various departments of the plant, in the latter year becoming vice-president and works manager, positions which he occupied until he became president last month. In addition to building up an effective apprenticeship system in his own plant, Mr. Falk has also served for ten years as chairman of the Apprenticeship Committee of the National Metal Trades Association in Milwaukee.

DAVID C. SPOONER, JR., for over twenty years associated with the appliance activities of the General Electric Co., Schenectady, N. Y., has been appointed manager of the newly formed "pioneer products" section of the company's appliance division. The new section will handle products not logically falling within the scope of existing sections. H. A. COOK, assistant commercial engineer for G.E. wiring materials, has been named manager of the new miscellaneous construction materials sales section by J. H. CRAWFORD, manager of the Construction Materials Division. The chief function of this section, also just formed, will be the introduction of new lines and cooperation with other sections in the addition of new devices and products.

J. A. RATERMAN

P. A. ABE

W. A. BARR

P. A. ABE, works manager of the Monarch Machine Tool Co., Sidney, Ohio, has been elected vice-president in charge of engineering and production. J. A. RATERMAN, purchasing agent, has been named vice-president in charge of purchasing and plant engineering.

Mr. Abe started with the company as a lathe operator in 1915 after having served as a machinist apprentice in St. Mary's, Ohio. During his 25 years with Monarch he has come up through the ranks as toolmaker, toolroom foreman, general foreman, superintendent, and works manager.

Mr. Raterman started to work at Monarch as a machinist in 1917. Since then he has been company salesman, superintendent in charge of assembly, head of the production control department and purchasing agent. Both men have been directors of the company for the past three years.

DELBERT GOLTZ, secretary Standard Tool & Die Corp., West Allis, Wis., has been named general manager.

D. S. BRISBIN, Columbus-McKinnon Chain Corp., Tonawanda, N. Y., has been re-elected president of the Motor & Equipment Manufacturers Association. F. W. SWANSON, Globe Hoist Co., Des Moines, Iowa, has been elected vice-president; while R. L. SOMMERVILLE, Electric Storage Battery Co., Philadelphia, Pa., was named secretary.

CHARLES M. KEARNS, JR., in charge of the vibration department of the Hamilton Standard Propellers Division of United Aircraft Corp., East Hartford, Conn., has been chosen to receive the Lawrence Sperry Award for 1939. The award is made for signal contributions to the advancement of aeronautics by the Institute of the Aeronautical Sciences. Mr. Kearns received the award and $250 prize for his work in the "successful application of methods of measuring propeller vibration stresses in flight."

WILLIAM A. BARR, for the past eight years vice-president in charge of manufacturing for the Foote Bros. Gear & Machine Corp., Chicago, Ill., has been elected president. Mr. Barr first became associated with the company in 1929. Upon the resignation of F. H. FOWLER, former president, in November, 1939, he was elected executive vice-president and general manager.

DR. A. LLOYD TAYLOR, for the past six years director of the department of chemistry of Pease Laboratories, New York, N. Y., has resigned to join the technical staff of Oakite Products, Inc., New York, N. Y.

ARTHUR R. TINNERHOLM has been appointed product engineer of the plastics department at the Fort Wayne, Ind., plant of the General Electric Co.

L. R. WESTBROOK, formerly assistant director of the Cleveland experimental laboratory of the Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Del., has been appointed research manager of the Electroplating Division with headquarters in Cleveland.

JOHN R. WILLIAMS, for the past 45 years associated with the Electric Storage Battery Co., Philadelphia, Pa., has retired as president. R. C. NORBERG, vice-president and general manager, will take his place.

W. W. WILLIAMS, general manager Babcock & Wilcox Tube Co., Beaver Falls, Pa., is relinquishing his position as of March 1 to go into business for himself on the Pacific Coast.

ELLSWORTH F. WILSON has been appointed to the engineering department of Hanson-Van Winkle-Munning Co., Matawan, N. J. Additional sales representatives include H. E. MOYER, Los Angeles, Calif.; W. W. WIELAND, Matawan, N. J.; JACK D. CLAYTON, Detroit, Mich.

PLANT EXPANSION

AC Spark Plug Division of General Motors Corp., Flint, Mich., is planning immediate construction of a large spark plug plant in that city. The new structure will provide 156,000 sq.ft. of floor space.

Ajax Flexible Coupling Co. has completed a new addition to its plant in Westfield, N. Y., to house enlarged electric welding and assembly departments.

Douglas Aircraft Corp., Los Angeles, Calif., is planning to erect a huge assembly plant at the Los Angeles Municipal Airport in the near future.

Pacific Aviation, Inc., recently organized in Hawthorne, Calif., is planning erection of an aircraft parts factory there for the manufacture of radio equipment, hydraulic units, special valves, brakes and other equipment used by the aircraft industry.

Rustless Iron & Steel Corp., Baltimore, Md., is planning a $600,000 expansion program to provide an addition to its melting department, installation of a new electric arc furnace and rearrangement of equipment.

BUSINESS ITEMS

American Machine & Metals, Inc., East Moline, Ill., has established district offices in Pittsburgh, Pa., and West Hartford, Conn. R. A. ARMSTRONG will be in charge of the Pittsburgh office, while P. P. JOHNSTON will supervise sales in the New England area.

Cowles Detergent Co., Cleveland, Ohio, manufacturer of industrial alkalies and soaps, has appointed Eaton-Clark Co., Detroit, Mich., as distributor for its line of anhydrous metal cleaners.

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, has moved its New York office to 233 Broadway.

E. A. Kinsey Co. is moving its Indianapolis, Ind., home office from 235 S. Meridian St. to its new building at 725 N. Capitol Ave.

Ransome Concrete Machinery Co., Dunellen, N. J., has appointed the Welding Engineering Sales Corp., New York, N. Y., as metropolitan representative for its line of welding tables and positioners.

Worthington Pump & Machinery Corp., Harrison, N. J., has announced that its subsidiary, Moore Steam Turbine Corp., Wellsville, N. Y., will henceforth be conducted as the Moore Steam Turbine Division of the parent corporation. For three years Moore Steam Turbine was a wholly owned subsidiary of the Worthington Pump & Machinery Co.

OBITUARIES

OTTO LUNDELL, who until his retirement a year ago from active business was president of Michigan Tool Co., Colonial Broach Co., and Detroit Tap & Tool Co., died Feb. 22 in Fort Lauderdale, Fla. He was 60 years of age.

Born in Sweden, Mr. Lundell received his technical education at the

OTTO LUNDELL

Chalmers Institute in Gothenberg, coming to America in 1908. He worked for six years in Rockford, Ill., as a machinist and department superintendent for a prominent machinery manufacturer. In 1915 Mr. Lundell and his associates organized Michigan Tool Co. with himself as vice-president, in which capacity he served until 1935, when he became president. In 1918 he organized Colonial Broach Co. and was president until his retirement. He also organized Detroit Tap & Tool Co.

Mr. Lundell was also active in the Swedish Engineering Society and in the American Society of Steel Heat-Treating.

ROBERT E. CREIGHTON, vice-president in charge of manufacturing Vonnegut Moulder Corp., Indianapolis, Ind., died Feb. 12.

JOHN H. SHOAF, 71, owner and president Shoaf Cutter Co., Indianapolis, Ind., machinery manufacturer, died recently.

GEORGE O. SUPPES, 60, president Suppes Forge & Foundry Co., Johnstown, Pa., died recently at his home in that city following a brief illness.

JAMES A. HITTLE, 64, president Hittle Machine & Tool Co., Indianapolis, Ind., died recently.

GEORGE H. LOOMIS, 63, superintendent Sharon Hardware Mfg. Co., Sharon, Pa., and identified with the company since 1910, died Feb. 18 of a heart attack at his home in that city.

SAMUEL ADAMS LYNDE, 83, former vice-president of the Chicago & North Western Railway Co., Chicago, Ill., died Feb. 22 in Chandler, Ariz.

MEETINGS

AMERICAN GEAR MANUFACTURERS ASSOCIATION. Annual convention, Grove Park Inn, Asheville, N. C., May 20-22.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Summer convention, Swampscott, Mass., June 24–28.

AMERICAN IRON & STEEL INSTITUTE. Forty-ninth general meeting, Hotel Waldorf-Astoria, New York, N. Y., May 23.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting, Hotel Bancroft, Worcester, Mass., May 1–3.

AMERICAN SOCIETY OF TOOL ENGINEERS. Annual meeting, Hotel New Yorker, New York, N. Y., March 7–9.

AMERICAN SOCIETY FOR TESTING MATERIALS. Spring meeting, Hotel Statler, Detroit, Mich., March 6. Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 24–28.

ASSOCIATION OF IRON & STEEL ENGINEERS. Annual spring conference, Hotel Netherland Plaza, Cincinnati, Ohio, April 1 and 2.

MACHINE TOOL ELECTRIFICATION FORUM, East Pittsburgh, Pa., works of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., May 6–8.

MIDWEST POWER CONFERENCE. Annual conference, Palmer House, Chicago, Ill., April 9 and 10.

INTERNATIONAL ACETYLENE ASSOCIATION. Fortieth convention, Schroeder Hotel, Milwaukee, Wis., April 10–12.

PACKAGING INSTITUTE. Machinery division meeting, Hotel Astor, New York, N. Y., March 25.

SOCIETY OF AUTOMOTIVE ENGINEERS. National aeronautic meeting, Washington Hotel, Washington, D. C., March 14 and 15. National transportation and maintenance meeting, Mellon Institute, Pittsburgh, Pa., March 28 and 29.

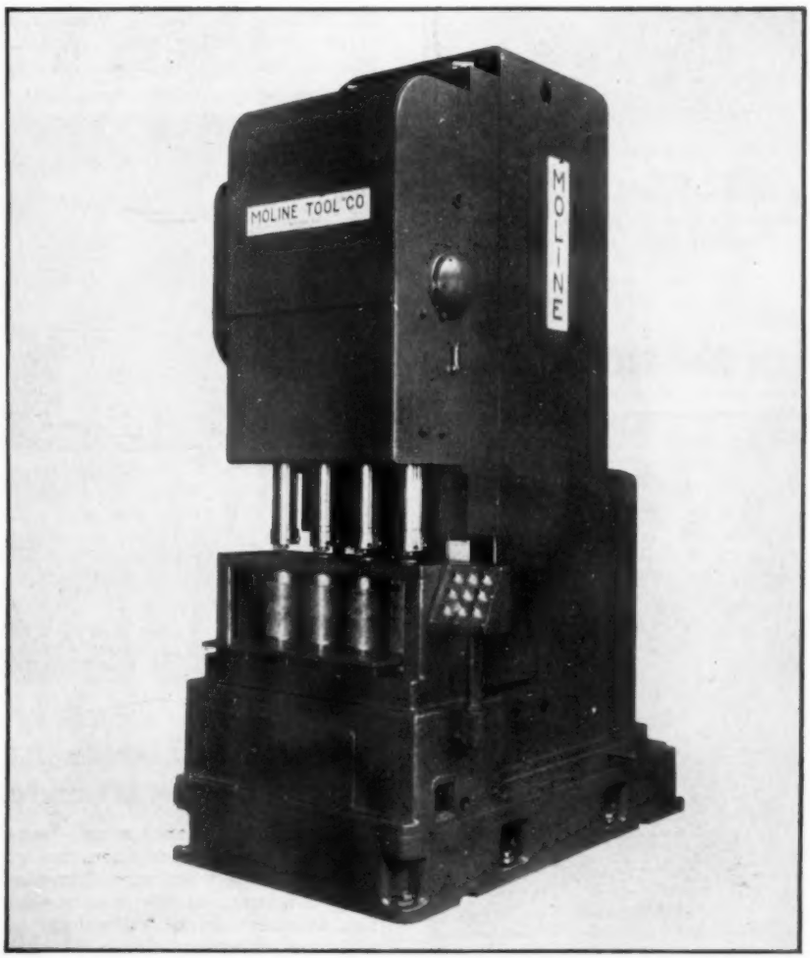
SHOP EQUIPMENT NEWS

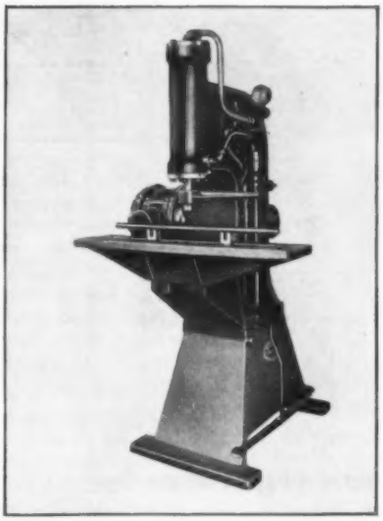
Moline Four-Spindle Precision Boring Machine Designed for Finishing Cylinder Blocks and Sleeves

Moline Tool Co., Moline, Ill., answers the demand for a precision cylinder block and boring machine with the No. 116FB four-spindle machine shown. Though radically new in appearance, this unit retains many proved features of older models while incorporating several innovations.

Machine spindles are of the extended-sleeve type, mounted in super-precision ball bearings lubricated automatically. Spiral spindle drive is totally inclosed and lubricated by a continuous flow of oil. Power is transmitted through V-belts with no intermediate spur or bevel gears. Rail carrying the boring spindles is mounted on a sliding carriage having exceptionally long bearing surfaces which slide on heavy double-V guides. Guides are lubricated automatically by a pressure lubricating system. Tapered gibs are provided to keep the head in alignment.

Hydraulic feed is furnished with automatic electric pushbutton control of the feed cycle. Variations in feed rate are obtained by changing the setting of a volume control lever on the hydraulic unit. Automatically retracting boring heads enable tools to be rapidly withdrawn from work without stopping spindle rotation. Machine is capable of boring ⅝-in. diameter sleeves of about 200 Brinell with a cutting speed of 550 ft. per min. at a feed such that sleeves 11 in. long are bored in 1 min. 35 sec.





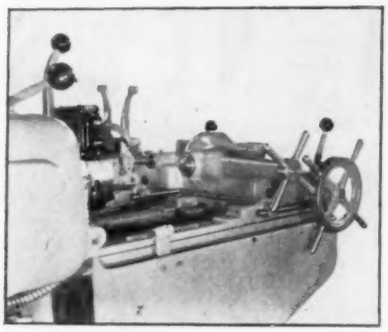
Greenerd 6-Ton Press Features Continuous Pressure

Controlled even pressure may be held on work indefinitely with the No. H-57 6-ton hydraulic press developed by Greenerd Arbor Press Co., P. O. Box 415, Nashua, N. H. This machine is completely self-contained, with pressure control of from ½ to 6 tons on the down stroke. Frame and cylinder are of cast semi-steel. Motor and pump are mounted on opposite sides of the main housing, with the pump connected between a control valve and a sixteen-gallon sump in the base. Piston is of steel with three cast-iron rings. Ram is machined of alloy steel, heat-treated and ground. Stroke is adjustable from one to sixteen inches. Standard equipment includes motor and starter.

Collet Chuck Carriage Front Built for Landis Machines

Landis Machine Co., Waynesboro, Pa., has developed a collet chuck carriage front for use on both "Landmaco" or Landis standard threading machines. Carriage front is provided with a collet-holding device of the type usually employed on automatic screw machines. Collet chuck is actuated by a handwheel, which is located in about the same position as the handwheel of the standard carriage front. Separate collets are employed for each diameter of work. Collets are readily interchanged.

Among the advantages of the new carriage front are the assured pro-

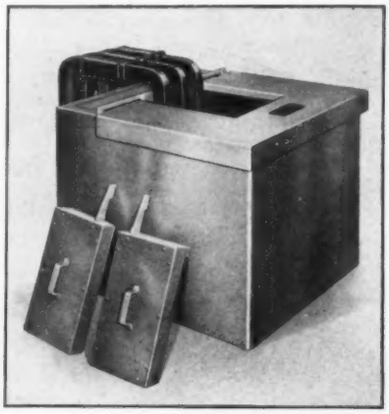


duction of concentric threads, for the work is held rigidly in alignment with the die head, and elimination of gripper markings on the work. In addition, long pieces may extend entirely through the collet, a work stop being employed to position the work in relation to the die head, while very short work may be positioned by an adjustable stop within the bore of the collet.

Three-Phase Furnace Has Individually Adjustable Electrodes

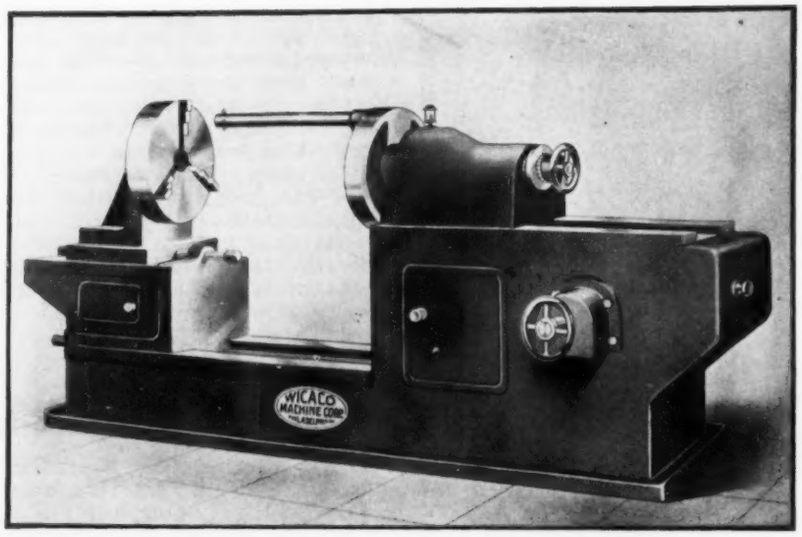
A new design three-phase electrode furnace having vertical individually adjustable electrodes had been developed by The A. F. Holden Co., New Haven, Conn. These electrodes may be used on the narrow width of this type furnace up to 30 in. in length. Construction is such as to permit loading from three sides.

For loading and unloading, the furnace is equipped with a cover plate which drains any bath back into the furnace. Hand-operated covers are



used for overnight shutdowns or small individual loads. A flexible cover is being developed which can be used while work is in process. This cover will reduce heat input considerably.

"Wicaco" Heavy-Duty Oil Groover Designed for High-Speed Production



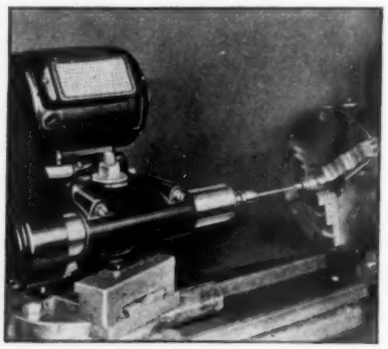
The "Wicaco" heavy-duty horizontal oil groover developed by Wicaco Machine Corp., Stenton Ave. & Louden St., Philadelphia, Pa., comprises a high-speed production machine suitable for holding odd-sized, irregularly shaped machine members for grooving. Special fixtures substituted for the stationary work-holding chuck permit high production on any unusual shape.

Controls are grouped for simplicity. Almost all mechanical motions of the machine are produced by the reciprocating toolhead. Reciprocating and rotating tool speeds are independently variable by means of change gears, thus making possible any predetermined groove pitch. Automatic feed can be preset and changed while machine is in operation. Crank motion for reciprocating the toolhead is also adjustable while machine is running. Adjusting the throw of this crank changes the length of the groove. Disengaging the clutch which actuates the rotary motion of the tool results in a straight groove or keyway.

All parts are easily accessible, with change gears inclosed in one end of the machine. Entire machine is automatically lubricated by a circulating lubrication system. Unit is driven by a built-in 3-hp. motor. Specifications: Maximum groove length, 22 in.; maximum groove diameter, 20 in.; machine length, 10 ft. 1 in.; diameter of toolpost faceplate, 20 in.

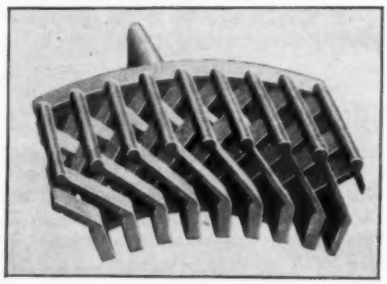
Mounted Wheel Shank Support Aids in Grinding Small Holes

A mounted wheel shank support for internal grinding with small diameter wheels has been developed by the Dumore Co., Racine, Wis., especially for grinding small diameter holes to considerable depths. A special 3-in. wheel shank is necessary for use with the support. The tapered support fits over the shank, minimizes the possibility of whip, and greatly reduces the time required for many jobs. Shank is 2 11/16 in. long and 0.2204 in. in diameter at its larger end. It has a taper of ⅜ in. per ft.



"Valv-Amp" Rotor Improves Induction Motor Construction

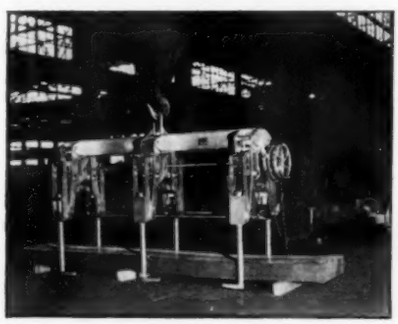
Offering the advantage of longer motor life with less maintenance, the "Valv-Amp" type of rotor construction developed by General Electric Co., Schenectady, N. Y., makes possible the use of cast aluminum rotors in the larger sizes of double squirrel-cage motors for high starting torque, low starting current service. This rotor makes use of a unique shape of rotor slot and a special method of assembling rotor punchings to control the flow of starting current. As a result, without the use of a switch or other moving parts, current is permitted to flow in the outer squirrel-cage when the motor is started, thus producing high starting torque. Then



when the rotor comes up to speed, current flows through the entire rotor winding, resulting in superior running characteristics.

Cullen Friestedt Lifter Handles Various Width Sheets

Cullen-Friestedt Co., 1300 S. Kilbourn Ave., Chicago, Ill., has developed an entirely new type of lifter for handling various widths of sheet steel. An important feature is its ability to handle two bundles of steel side by side, and also single bundles of various widths within the minimum and maximum opening range. The lifter also is said to eliminate almost entirely the possibility of damaging the edges of the sheets, and is claimed to make the handling of this material both faster and safer. In use, the lifter is lowered over hundles

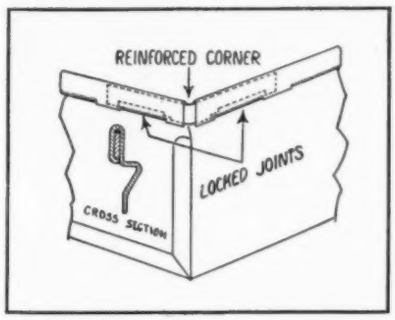


with the prongs parallel to the length of the sheets. When at the proper height the prongs are swiveled 90 deg., which brings them under the packs. A few turns of the handwheel closes the lifter so that the vertical legs are in contact with the sides of the pack and the lift is ready to be made. Opening and closing mechanism is operated by spiral gear reductions fully inclosed and running in oil.

Lifter illustrated is of 7-ton capacity and has opening range sufficient to handle single packs of sheets from 15 to 30 in. wide, or two packs at a time totaling not over 30 in. in width. Legs are 22 in. deep and are spaced 48 in. apart to correspond with rollers of runout table. These dimensions can be varied and lifters made with as many legs as desired so as to suit individual plant requirements.

Pollard Stacking Boxes Feature Improved Corners

The Pollard Bros. Mfg. Co., 5503 Northwest Highway, Chicago, Ill., has developed an improved reinforced corner for stacking boxes and open-end boxes. These reinforced corners are incorporated in five standard sizes of both the stacking box and the open-end box, and can be provided on all sizes of stacking boxes.



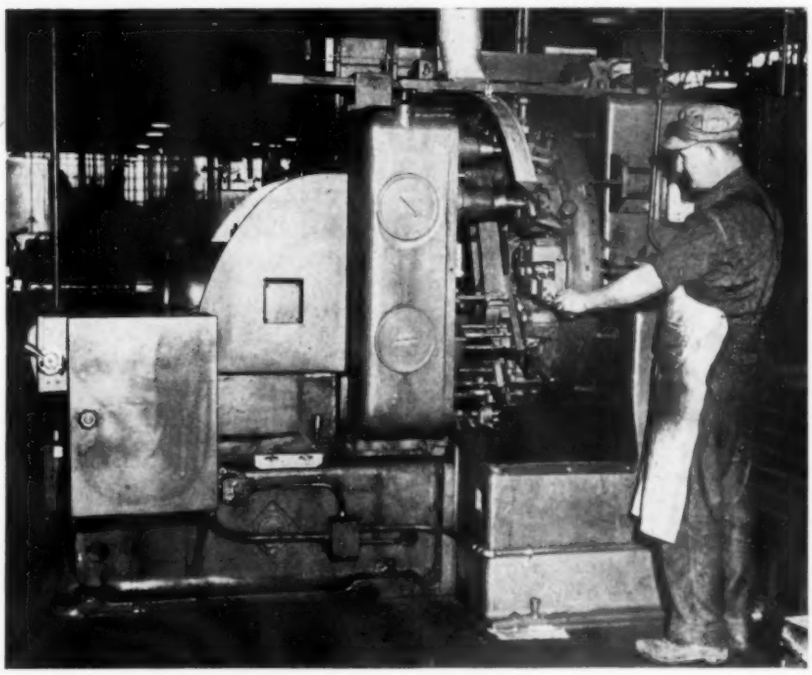
"Presto" Turret Toolholder Accommodates Four 3-8-in. Bits

Designed to increase machine tool efficiency by decreasing the time lost in changing toolbits, the "Presto" turret-type toolholder made available by The Presto Tool Mfg. Co., 518 Newport Ave. N., Detroit, Mich., takes four ⅜-in. toolbits which can be set individually for the correct height. Indexing is said to be accurate, and works as follows: Open nut on back of toolholder, turn turret toward operator until required tool snaps into position and locks, then tighten nut, which automatically brings turret against lock.

Special Greenlee Machine Finishes Oil Pump Bodies

Greenlee Bros. & Co., 12th St. & Columbia Ave., Rockford, Ill., has designed a special unit for machining oil pump bodies. This one-way horizontal multiple-spindle drilling and boring machine is arranged with a twelve-position hand-indexing turret, each position being provided with one holding fixture. It completes all drilling, boring and facing operations, in the following sequence:

Load one oil pump body; 29/64-in. drill for 0.5005–0.4995, ream, 21/64-in.; drill for 0.3435–0.3430, ream; 21/64-in. drill for 0.3705–0.3695, ream, 11/16-in. spot drill for chamfer of 0.560–0.559, ream; rough bore 1.320–1.322 in. diameter, 35/64-in. drill for 0.560–0.559, ream half-way through; semi-finish counterbore 0.354–0.355 diameter, 11/16-in. spot drill for 0.5005–0.4995, ream; rough bore 1.320–1.322 diameter, broach oil groove; semi-finish ream 0.493–0.484, finish ream 0.344–0.345, 9/16-in. drill for 0.3705–0.3695; semi-finish bore 1.345–1.347, 35/64-in. drill for 0.560–0.559, ream through; semi-finish bore 1.345–1.347 diameter;

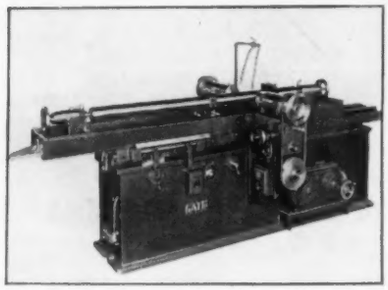


finish ream 0.560–0.559 through, 15/32-in. drill to depth; combined finish bore 1.360–1.362 and 0.3705–0.3695 diameter; combined finish bore 1.360–1.362 and 0.5005–0.4995 diameter.

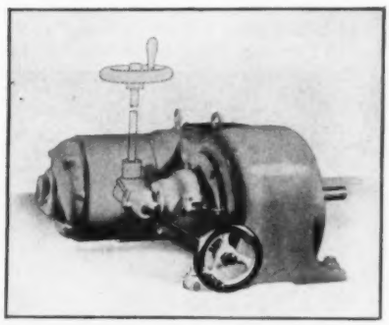
Location of the work is against the milled contact face and against a stop at one end. Clamping is manual, endwise by a hand knob and against the face by a star wheel. Production is 80 pieces per hour.

Gatco Duplex Spline Miller Swings 5 1-2 in. Diameter

The "Gatco" duplex spline miller marketed by Giern & Anholtt Tool Co., 1312 Mt. Elliott Ave., Detroit, Mich., is of welded steel construction with exception of the tables, which are of cast iron. These tables are so arranged that the top unit can be



pushed into any location and then locked to the lower table, which imparts the reciprocating motion hydraulically. The machine has a capacity of 96 in. between centers and swings a maximum diameter of 5½ in. Cutters from 3/16 to 1 in. can be used. Spindle speed range is 230 to 600 r.p.m.



"Varidrive" Remote Control Permits Inaccessible Mounting

A right-angle remote control for "Varidrive" motors has been developed by U. S. Electrical Motors, Inc., Dept. 23, 80 34th St., Brooklyn, N. Y. This control provides a simple, accurate means of selecting the desired operating speed of the unit when mounted in inaccessible positions. The control shaft may be extended at a 90-deg. angle in any one of eight different directions. A set of inclosed right-angle helical gears makes this possible.

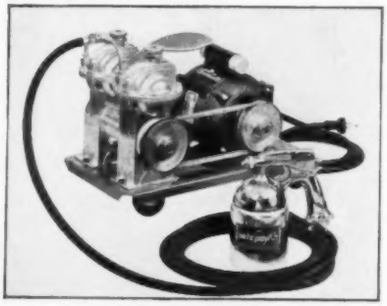
Progressive Fixture Speeds Welding Production

A combination of short-circuiting gun and clamping fixture developed by Progressive Welder Co., 701 Piquette Ave., Detroit, Mich., is being used for making spot welds in semi-

inaccessible locations where intricately shaped, thin section welding points could not stand up under continued operation. The fixture is arranged for either one or two man operation and has an inclosed transformer short coupled to bus-bars which also serve as nesting dies for the work. A single hydraulically-operated spot welding gun, of the short-circuiting type, is used alternately by the two operators when production speeds require two-man operation.

"Sprayit" Units Suitable for Small-Lot Production Painting

The Electric Sprayit Co., Sheboygan, Wis., has developed a portable paint spraying unit designed for general maintenance painting and suitable for small-lot production work. The unit is equipped with a twin-cylinder



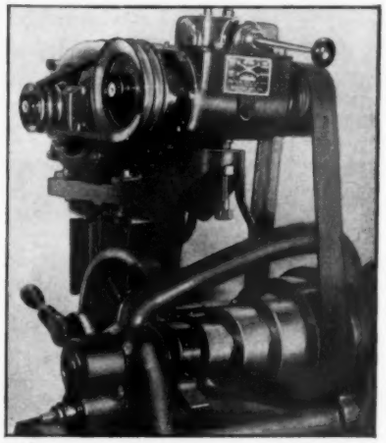
compressor of the diaphragm type, which insures oil-free air with a minimum of pulsation. Compressor is V-belt driven by either a ½-hp. electric motor or a ⅝-hp. gasoline engine. Diaphragms are of special laminated construction, last over 500 hours, and are easily replaced.

Displacement is over 5 cu.ft. per min., with a spraying pressure of over 40 lb. Spray gun is of the pressure feed internal mixing type.

"Western" Transmissions Made For Smaller Machine Tools

Western Mfg. Co., 3428 Scotten Ave., Detroit, Mich., has made available a line of variable-speed transmissions especially designed for application to machine tools where a motor-driven, self-contained, selective-speed transmission is desirable. Providing four speeds forward and reverse, the transmission is controlled by a single lever conveniently located.

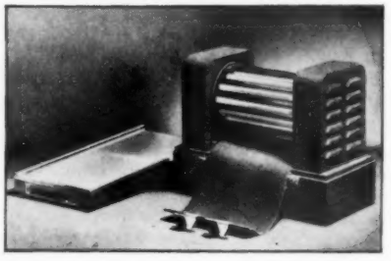
Gears and splined shafts are of alloy steel, heat-treated and ground. All rotating shafts are mounted on



anti-friction bearings, with all moving parts running in an oil bath. Three lines are available: the Master, 1–5 hp.; the Major, 5–10 hp.; and the Super, over 10 hp. capacity.

Mimeograph Printer Copies Line Drawings Accurately

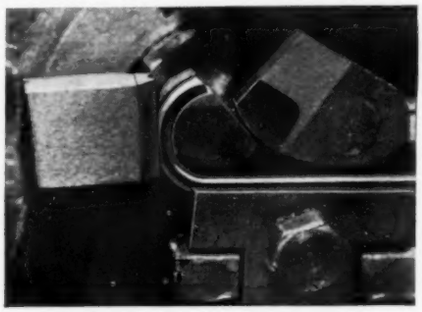
A brilliant light source has made possible a method of making quantity duplicates of line drawings, which is utilized in a printer offered by A. B. Dick Co., Chicago, Ill. By exposure to this light in the "Mimeograph" photochemical printer, any opaque drawing on translucent cloth or paper can be transferred to a sensitized stencil sheet. The stencil is then developed and placed in the Mimeograph duplicator for accurate black-and-white reproduction in



(advertisement)

2,130 Miles of Wire Coiled With Carboloy Point

L. A. Young Spring and Wire Corporation, Detroit, reports that on one Carboloy coiling point they coiled more than 11,250,000 ft. of 7½ gage Swedish commercial type "OT" valve spring wire. In this plant Carboloy Points average 30 times the life of High Speed Steel points per refinish and require only one-half the time it takes to refinish H. S. S. points. Due to the extra



amount of stock removed in refinishing H. S. S. points, Carboloy outlasts H. S. S. 500 to 1 per inch of wear. Carboloy-tipped pitch tools and arbors outwear H. S. S. at approximately the same ratio. This performance is indicative of the results obtained by this company in coiling various sizes of steel wire from .008″ dia. to $\frac{5}{16}$″ dia. for such products as automobile seats, clutch springs, brake springs, window regulator springs, mattress springs, etc.

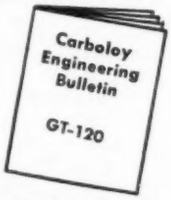
Carboloy Sizing Dies For Bolts, Nuts, Roller Chain Cylinders, Etc.

Carboloy sizing dies for bolt and rod work effect closer tolerances on pitch diameter of rolled thread, longer life for thread rolling dies and less down time on machine. Furnished in rounds or shapes for sizing bolts, nuts, etc.

As an indication of the economy of Carboloy sizing dies, one mill reports sizing 1,900,000 pieces of .07-.10 carbon drawn stock, with die wear of .0001″. Reduction was .070″.

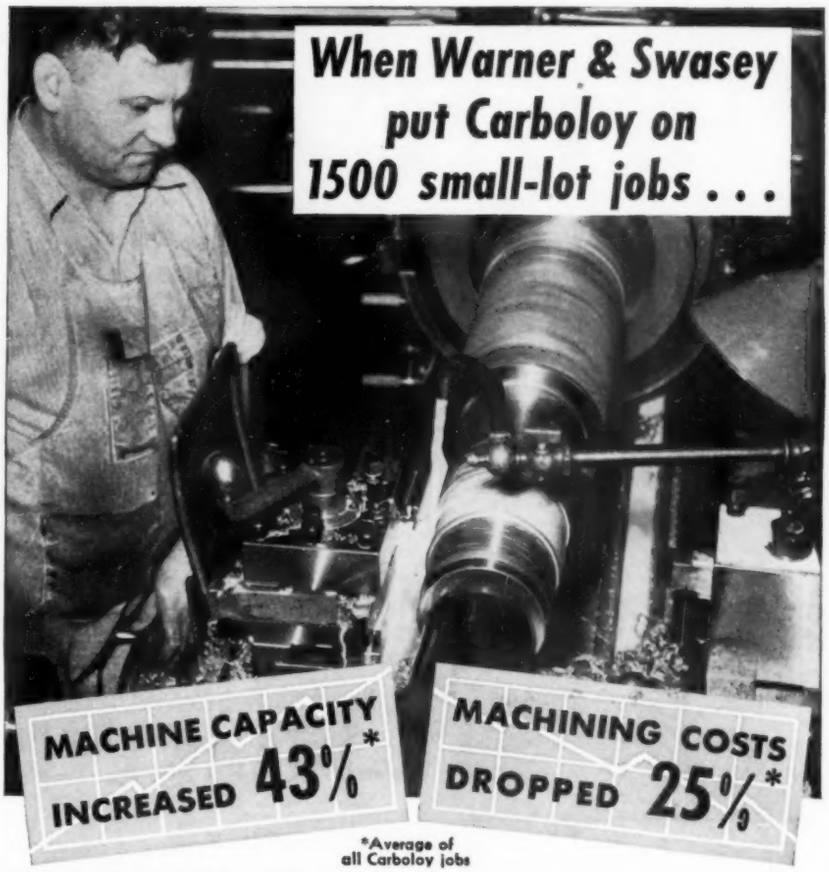
Steel Cutting Recommendations Contained In New Carboloy Engineering Bulletin

A new engineering bulletin recently issued contains basic data on requirements for cutting steel with Carboloy tools. Gives tool design, set-up, coolants, chip breaking and machine requirements. Particularly valuable is a table giving specific recommendations for speeds, feeds, Carboloy grades, tool rakes and angles, etc. Ask for Carboloy Bulletin No. GT-120.



Carboloy Masonry Drills

Your maintenance man would like to know about the Carboloy Masonry Drill. Drills concrete, brick, tile, etc., 75% faster than old methods. Ask for leaflet GT-103.


When Warner & Swasey put Carboloy on 1500 small-lot jobs . . .
MACHINE CAPACITY INCREASED 43%*
MACHINING COSTS DROPPED 25%*
*Average of all Carboloy jobs

Is it economical and practical to use cemented carbide on small-lot, diversified machining work? That's the question Warner & Swasey asked themselves—set out to find the answer to in their own plant. Comparable to job shop work was the problem of W & S:—Lots range from 20 to 100 pieces. Steel, cast iron, bronze, etc., are machined. Operations include the usual boring, facing, turning, chamfering, etc.

To meet these conditions, a period of adjustment followed: Tool styles, sizes and grades (of Carboloy) were "boiled down" to a minimum number of general purpose standards; facilities for rapid grinding and maintenance of carbide tools established; necessary controls on carbide use provided.

With this accomplished, the wheels started turning! Simple jobs at first. Then the "tough" ones—such as taking ⅜″ to ½″ roughing cuts over 37 linear inches of S.A.E. 1050 spindle forgings. Today 1500 successful Carboloy jobs are "on the record," with an average increase of 43% in machine capacity, and an average drop of 25% in machining costs. "Extra dividend" is the valuable source of carbide tool information now available to their sales-engineers—the men you rely upon for W & S Turret Lathe recommendations.

A 12-page booklet gives the facts—tool specifications, grades, speeds, feeds, etc. Yours upon request.

CARBOLOY COMPANY, INC., 11149 E. 8 Mile St., DETROIT, MICHIGAN

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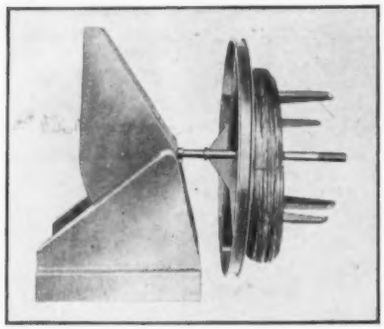
TUNGSTEN CARBIDE—TANTALUM CARBIDE—TITANIUM CARBIDE

FOR CUTTING, DRAWING, SHAPING, EXTRUDING METALS AND NON-METALLICS
★ FOR REDUCING WEAR ON EQUIPMENT OR PRODUCTS YOU USE OR MAKE ★

quantity. Time from finished tracing to finished copies is generally less than 25 min. Included in the original assembly are the portable printer, developing plate and all necessary accessories.

Moslo Counterbalanced Reel Adjustable to 42-in. Size

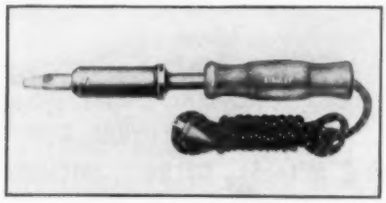
The "Shiftweight" counterbalanced tilting wire reel offered by Moslo Machinery, Inc., 5005 Euclid Ave., Cleveland, Ohio, uses a shifting counterpoise designed in such a way that regardless of the position of the wire coil, the necessary countering weight is in position. The ballast shifts within a housing as the reel is positioned.



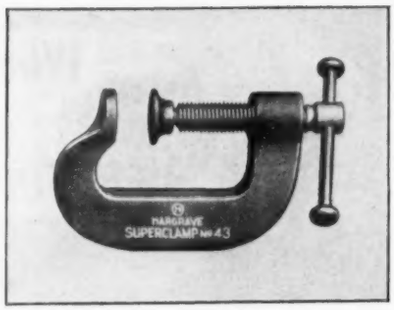
One man can easily place a 300 lb. wire coil on the reel and swing it into position. The locking latch is controlled through a knurled spindle through the center of the reel, readily accessible to the operator. Full brake adjustment permits control of drag. Reel arms are adjustable to the outside diameter of the 42 in. ring.

Stanley Soldering Irons Feature Plug-Type Tips

Electric soldering irons fitted with plug tips have been placed on the market by Stanley Tools, Division of The Stanley Works, New Britain, Conn. The plug tip used is inexpen-



sive and differs from the screw tip in that it is held in place by a screw. This lock screw permits easy adjustment and removal of the tip. The heating unit of the iron is hermetically sealed to prevent corrosion and is wound around a hollow core. Each iron is furnished with 6 ft. of heater cord, cord strain relief and a tool rest stand. These irons are made in four sizes, from 105 to 350 watts capacity, with tip diameters ranging from ⅜ to ⅞ in.

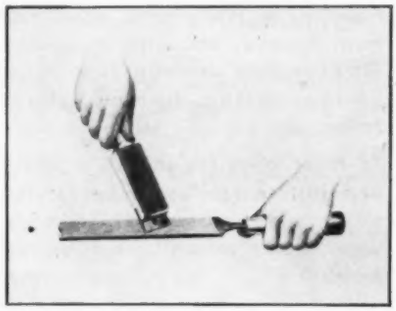


Hargrave Welders' Clamp Made in Five Sizes

Available with maximum openings of 4, 6, 8, 10 and 12 in., the No. 43 Hargrave welders' clamp offered by the Cincinnati Tool Co., Norwood, Cincinnati, Ohio, incorporates a screw made of splatter-proof material. Depth of throat ranges from 2½ to 3 in. for the different sizes and weight ranges from 4¾ to 11 lb.

Hargrave File Cleaner Has Chip Plow Plate

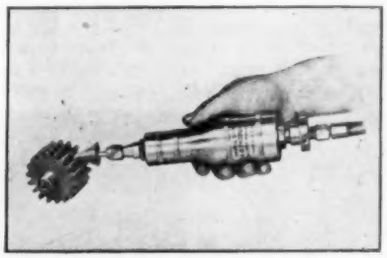
The Cincinnati Tool Co., Norwood, Cincinnati, Ohio, is offering the "Hargrave" No. 366 file cleaner with chip plow for cleaning a file of soft metal chips, such as those produced when filing lead, copper, aluminum and soft steel. The plate or scraper is fastened to the handle of a standard file brush and the four edges may be used at will, or the plate may be set in a disengaged position and only the regular file card used. The plate or scraper is used by striking one edge on the file to be cleaned,



so as to impress the tooth pattern on its edge. The scraper is then pushed parallel to the file grooves so that it plows out the embedded chips and dirt.

"Utility" Pneumatic Grinder Has Grease-Sealed Bearings

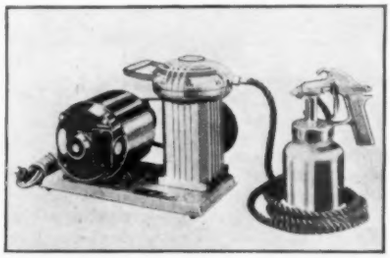
The Model U—TR "Utility" pneumatic grinder offered by M-B Products, 130 E. Larned St., Detroit, Mich., is equipped with grease-sealed precision bearings for protection against impurities in the air line. Ruggedly designed for tough production jobs. this tool develops a speed of 60,000 r.p.m. with three impulse stages. Spindle is of extra heavy construction, and is made of a special alloy tool steel heat-treated and ground.



A steel housing is used for maximum safety. Weight is 2¼ lb. Over-all length is 9 in. Length of body is 5⅝ in. A toolpost adapter is available for lathe use.

Binks Painting Outfit Includes Pump and Gun

The Roche "DS" spray painting outfit announced by Binks Mfg. Co., 3114-26 Carroll Ave., Chicago, Ill., incorporates a single-diaphragm compressor driven by a ¼ hp. electric motor and a Roche "J" gun of internal atomization bleeder type. The gun is equipped with a flat spray nozzle and with a moisture filter.



The compressor delivers 2.2 cu. ft. per min. at 26 lb. per sq. in. working pressure. The unit also includes 12 ft. of ¼ in. braided hose and connections, giving a wide work radius.

Mellaphone Rectifier Has 660 Watts Output

The Model CR-6 electronic rectifier developed by Mellaphone Corp., Rochester, N. Y., converts a.c. into d.c. for operating five or six average size magnetic chucks or other d.c. equipment. Compact in size, this rectifier has a d.c. output of 660 watts (approximately ¾ hp.). It will withstand a 100 per cent overload for 5 min. without harm, thus making it suitable for d.c. motor operation where starting current is high. Two mercury vapor type tubes are used to full-wave rectify the single-phase a.c. line. The rectifier contains no moving parts. An "off-on" switch is pro-

vided, and red and green jeweled pilot lamps indicate when the current is "on". The unit measures 7½ x 5½ x 16½ in. and weighs 26 lb.

NEW MATERIALS

"Pluramelt" Process Produces Multiple-Composition Ingots

Termed "Pluramelt," a steel making process developed by Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa., makes possible production of steel ingots of more than one composition from which can be rolled sheets and plates having a thin cladding of stainless steel inseparably bonded to a thick layer of low-carbon steel. Originally developed for applying stainless to structural steel for use in fabricating pressure vessels for the oil refinery industry, the process has been developed to the point where practically any special alloy, including the high-speed steels, may be applied to a number of base-metal compositions.

The Pluramelt process is carried out in a special type of electric arc melting furnace designed so that the final product is intermelted with any other metal part and allowed to solidify as an inseparable portion of the unit mass. Thus the functions of steel making and of the mold are combined. Shop experience with Pluramelt indicates that it lends itself well to average shop practice, as it can be fabricated in the same manner as other metals.

"Durez" Molding Material Has Unusually Smooth Finish

Known as Durez 1900 Black, an easily preformed high-impact phenolic molding material announced by Durex Plastics & Chemicals, Inc., North Tonawanda, N. Y., is said to deliver an unusually smooth finish for a standard high-impact type plastic. Particle size is so controlled that it flows through hoppers and feeding devices easily. For this reason it is claimed to be suitable for many parts requiring a high-impact material which had previously been considered impractical for molding.

"Colorflex" Resin Improves Wood and Concrete Floors

Flexrock Co., 2300 Manning St., Philadelphia, Pa., has developed a pigmented resin for improving and preserving both wood and concrete floors. Known as "Colorflex," this compound penetrates the floor and presents a hard, enamel-like finish, which will withstand industrial traffic while at the same time cure dusting concrete. Application is made simply with a roofing or whitewash brush. "Colorflex" will dry overnight.

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TRADE PUBLICATIONS

BALL BEARINGS An eight-page folder issued by Fafnir Bearing Co., New Britain, Conn., describes features and lists specifications of a comprehensive line of ball-bearing lineshaft boxes.

BEARINGS Bartlett Hayward Div., Koppers Co., Baltimore, Md., has issued a booklet describing the new Fast's multiple oil film bearing, for which United States rights were obtained last summer from Gustave Fast. The booklet outlines the history of bearings, discusses the principles of Fast's bearing, and describes and illustrates its design.

CONVEYORS "Link-Belt® Conveyors in American Industry" is the title of a 48-page book, No. 1700, recently published by Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. This book shows a number of varied applications of conveyor equipment throughout industry.

DIESEL POWER Uses and applications of diesel power in industrial plants are discussed in a four-page folder, Form 5664, released by Caterpillar Tractor Co., Peoria, Ill.

FLOOR MAINTENANCE Form No. 582, issued by Porter-Cable Machine Co., 1714 N. Salina St., Syracuse, N. Y., describes the "tricraft" combination floor sander, polisher and steel wooler.

GREASE GUNS Specifications of a line of grease guns are provided in a leaflet distributed by the Vital Products Mfg. Co., 7500 Quincy Ave., Cleveland, Ohio.

HACKSAWS Catalog No. 70A, issued by Racine Tool & Machine Co., Racine, Wis., contains four pages of specifications concerning a line of power-driven hacksaws.

PIPE TOOLS Catalog No. 40, a 24-page bulletin published by Beaver Pipe Tools, Inc., Warren, Ohio, illustrates and describes a complete line of pipe and bolt threading and cutting tools and machines.

PLANT LOCATION "Pennsylvania —Its Many Industrial Advantages," a 28-page illustrated booklet published by the Department of Commerce, Commonwealth of Pennsylvania, provides extensive data and statistics concerning Pennsylvania's industry.

PRESSES Specifications and features of an extensive line of inclinable power presses are included in a 24-page illustrated catalog, No. 39, published by V&O Press Co., Hudson, N. Y.

SANDERS Porter-Cable Machine Co., 1714 N. Salina St., Syracuse, N. Y., discusses features of the "Take-About" portable sanders in a 6-page illustrated folder, Form No. 554.

SCREW MACHINES George Scherr Co., Inc., 128 Lafayette St., New York, N. Y., is distributing an eight-page catalog describing the features of "Tornos" high-speed automatic screw machines. Specifications are tabulated.

STOP NUTS Elastic Stop Nut Corp., 1015 Newark Ave., Elizabeth, N. J., has published its 1939 Catalog & Data Book which contains 56 pages explaining graphically the elastic stop nut principle, containing comparative test data and illustrating numerous applications.

TURRET LATHE Features of the No. 2 geared electric turret lathe with single lever controls are included in a six-page illustrated folder, No. 2 10M, issued by Bardons & Oliver, Inc., Cleveland, Ohio.

WELDING Condensed pictorial presentation of interesting welding, punching and riveting ideas is the basis of a new house organ, "Welding and Punching Pictorial," which has begun to be published by Progressive Welder Co., 701 Piquette Ave., Detroit, Mich.

NEW BOOKS

STEP OUT AND SELL!—*By William E. Holler, general sales manager, Chevrolet Motor Division, General Motors Corporation. 94 pages. 6 x 9 in. Published by The Dartnell Corp., 4660 Ravenswood Ave., Chicago. $1.50.*

A collection of time-tested fundamental sales principles is presented in short concise inspirational type chapters well emphasized with brief anecdotes and stories. The author makes no pretense of supplying new formulas for selling but recalls the often forgotten essentials of good salesmanship.

•

YOUR INCOME TAX; HOW TO KEEP IT DOWN—*By J. K. Lasser, certified public accountant. 128 pages. Published by Simon & Schuster, 386 Fourth Ave., New York. $1.*

This is the second edition of a convenient book which explains how to keep down income taxes by showing each and every legitimate deduction. Beginning with a clear and concise check list on what to include and what to exclude from income, deductions which may be made by a salaried man, and a business man, and items which may not be deducted, the book launches into a series of answers to

questions which arise in making out a tax return. Presented clearly and graphically and in the sequence in which they arise in filling out the forms, this book should assist in avoiding future assessments, penalties and interest charges.

Changes in the revenue laws and court decisions made in 1939 are included in this 1940 edition both in a general section and as revisions throughout the book.

The Other Fellow's Product

BY JOHN R. GODFREY

One of the things that gum up the manufacturing game, cause suppliers of parts no end of headaches, and arouse antagonism in everybody in general, is the inspection methods in some plants and the attitude of the P. A. The larger the plant the worse the disturbance and the more it costs everybody concerned.

Here is the tale of woe of a supplier of parts to one of the largest manufacturers in the country. Never mind the line, it applies to practically all the industries from automobiles to radio.

The XYZ Company wanted samples of parts to be supplied by a small shop, and wanted them p.d.q. They were sent promptly. After two weeks XYZ said the samples had been lost in the plant and asked for more, which were sent at once, to meet with the same fate. The third set of samples were duly sent, approved, and production started.

Then the first set, that had been lost, came back with a reject slip, saying they were not satisfactory. Next the second set came back, marked O.K. Knowing the way in which this company functioned, the suppliers paid no attention to the rejected lot. They figured two out of three wasn't a bad average anyhow.

Then the manager of the supplying concern bought one of the complete machines on the open market. He didn't ask for, or get, a trade concession of any kind. He checked up on the machine and found eleven defects that had to be remedied before he could use it. None of these defects were caused by errors in materials or parts supplied the parent company. They were all the fault of bad assembly and lax inspection of the units that made up the machine, and of the machine as a whole. Even a casual inspection before the machine was set up disclosed several errors that effectually prevented its functioning properly.

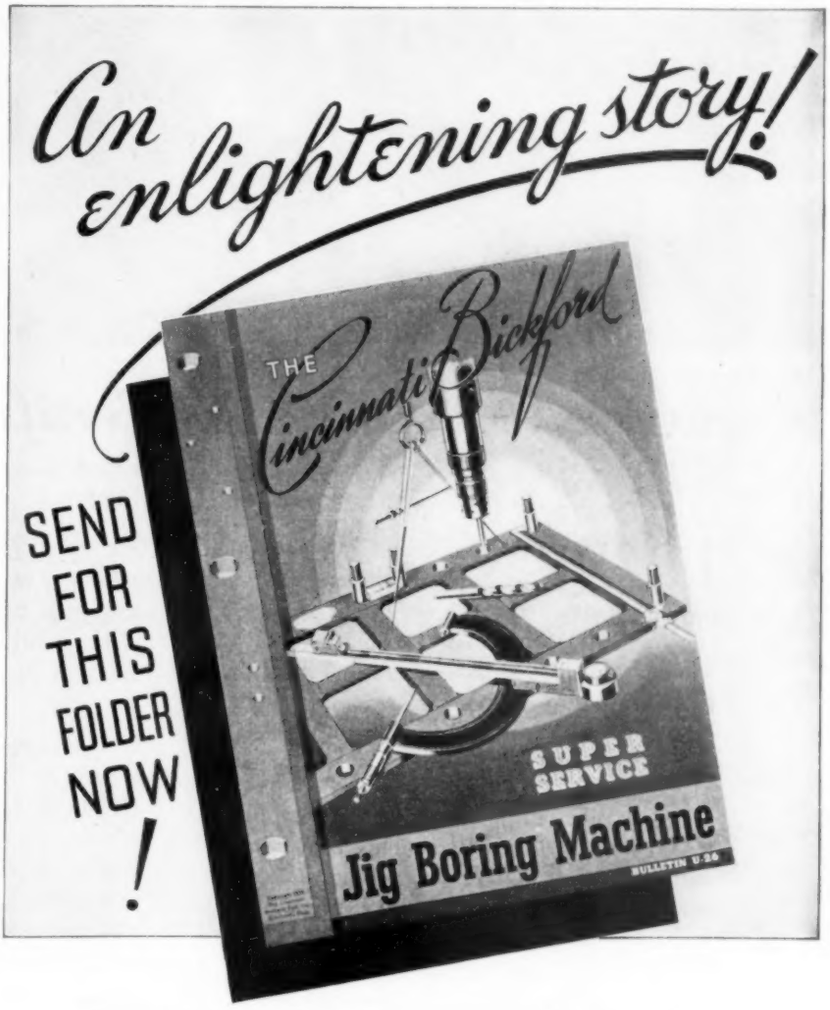
So Mr. Supplier listed them carefully, had the list attested by the agent from whom he bought the machine, and showed it to the P. A. at the first opportunity.

"We", he said, "expect to supply parts that are satisfactory. Some of your specifications are unnecessarily severe and make the parts cost you more than they should. We don't expect you to take parts or materials that are not satisfactory. But it seems hardly consistent for such a concern as this to raise hob with suppliers over trifles and fail to use even ordinary care in assembling these parts. Then, when they are all put together, they evidently go out with no final inspection whatever.

"These mistakes in my machine have cost me money in keeping it out of use. It has cost your agent money to put it in shape to do its work. And none of our men are likely to be enthusiastic about the machine when a visitor asks how they like it.

"What all big organizations like yours need is a little more human understanding. Your inspection of parts supplied by me and by others is arbitrary and rigid. Parts you make, and assembly of all parts, evidently go through without any inspection at all.

"We need your business. You evidently need us or you'd make these parts yourself. We'd all be better off if your incoming parts inspectors didn't feel they must reject as much as possible. Or if you put some of these 'rejectors' to checking your own assembly, you'd probably turn out a product the agents wouldn't have to rebuild."



Every plant manager who has or contemplates a tool room should know all about this brand new Cincinnati Bickford Jig Boring Machine.

It is suited not only to tool room work but also to small lot production that must be handled quickly and accurately without jigs. "Mistake-proof" features enable a drill press operator to obtain maximum performance. Write for bulletin U-26.

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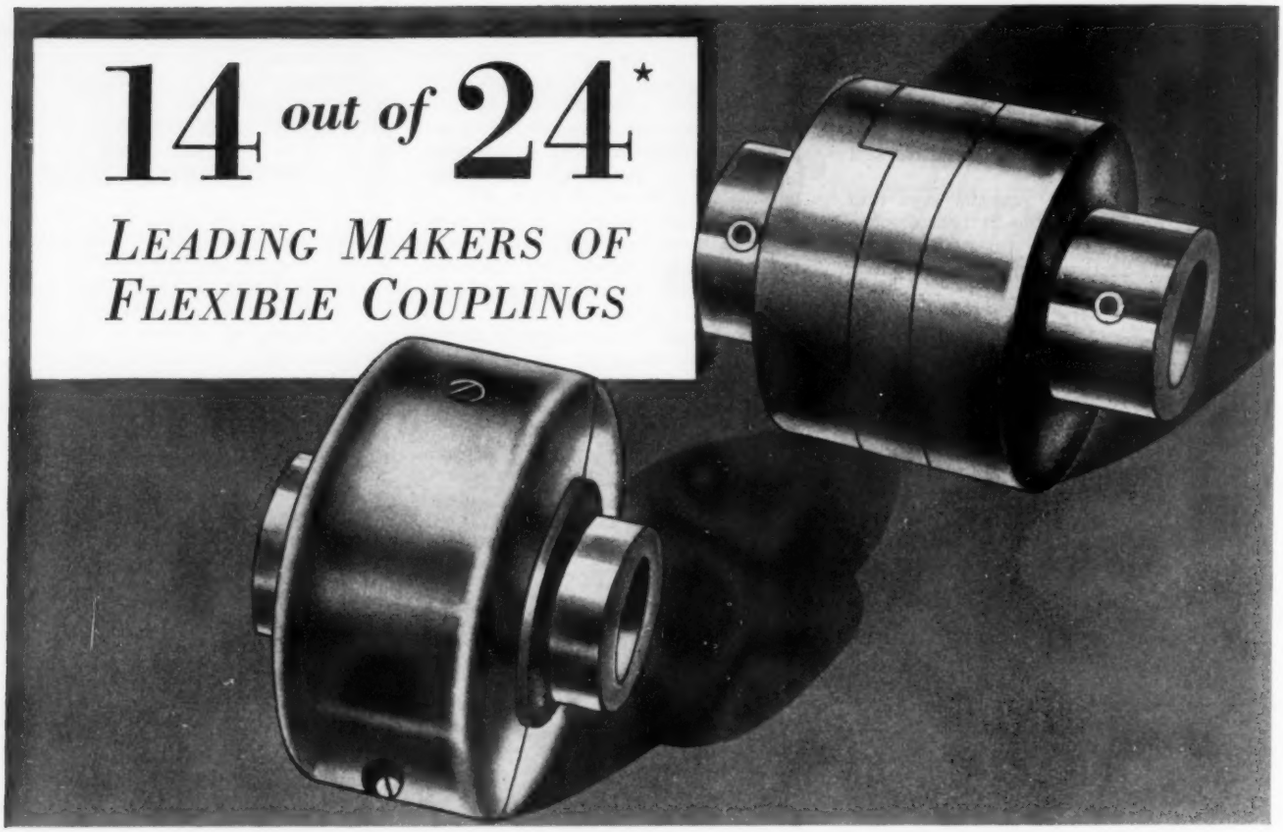

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